



DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

**SECTION 206 AQUATIC ECOSYSTEM RESTORATION
C-1 REDIVERSION PROJECT
BREVARD COUNTY, FLORIDA**

FINDING OF NO SIGNIFICANT IMPACT (FONSI)

I have reviewed the Environmental Assessment (EA) prepared for the Section 206 Aquatic Ecosystem Restoration Work involving the Rediversion of the Canal 1 (C-1) water flow at Brevard County, Florida. This will be accomplished through the construction of an Intermediate Water Control structure (IWCS) approximately at the midpoint of C-1. This will also incorporate two electric pumps installed along L-74 to transfer water from C-1 Retention and Detention Areas to the Sawgrass Lakes Water Management Area (SLWMA). This Finding incorporates by reference all discussions and conclusions contained in the EA enclosed hereto. I conclude that the proposed action will have no significant impact on the quality of the human environment. This conclusion is based on information analyzed in the EA. It also reflects pertinent information obtained from other agencies and special interest groups having jurisdiction by law and/or special expertise, and on comments and recommendations obtained after coordination of the EA. Reasons for this conclusion are, in summary:

1. There will be no adverse impacts to endangered species of flora or fauna, wetlands or significant fish and wildlife populations or habitats.
2. Water quality will not be adversely affected. Concerns expressed by the State of Florida Department of Environmental Protection (DEP) about a possible *Hydrilla* spp. infestation when the water flow is re-diverted, were addressed by the existence of local programs for the monitoring, detection, and eradication of *Hydrilla* and other exotic vegetation species in the C-1 retention and detention areas, as well as the Sawgrass Lakes Water Management Area.
3. The U.S. Army Corps of Engineers (Corps) has determined that the project is consistent with the Florida Coastal Management Program, as evidenced by correspondence from the Florida State Clearing House.
4. No hazardous, toxic or radiological waste materials (HTRW), were found to be present or at risk of being released at the work site.
5. No historic properties will be affected by this work.
6. Public benefits include the reduction of the ongoing dilution of salinity in Turkey creek and the Indian River Lagoon, and the restoration of the original ecosystems thereon. Other benefits include a longer hydroperiod and therefore a

longer biological treatment for the stormwater re-diverted from C-1. Any adverse effects will be temporary, will occur during construction, and include incidental noise and vehicular exhaust fumes. Construction activities will be planned, scheduled and sequenced to minimize adverse effects.

In consideration of the information summarized, I find that the proposed action will not significantly affect the human environment and does not require an Environmental Impact Statement.

7 FEB 05

Date

A handwritten signature in cursive script, reading "Robert M. Carpenter", written over a horizontal line.

Robert M. Carpenter
Colonel, U.S. Army
District Engineer

DECEMBER 2004

Environmental Assessment

SECTION 206 AQUATIC ECOSYSTEM RESTORATION

C-1 REDIVERSION PROJECT

Brevard County, Florida



**U.S. Army Corps
of Engineers**
JACKSONVILLE
DISTRICT

**Environmental Assessment
ON
SECTION 206 AQUATIC ECOSYSTEM RESTORATION
C-1 REDIVERSION PROJECT
Brevard County, Florida**

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**Environmental Assessment
ON
SECTION 206 AQUATIC ECOSYSTEM RESTORATION
C-1 REDIVERSION PROJECT
Brevard County, Florida**

1 PROJECT PURPOSE AND NEED

1.1 PROJECT AUTHORITY.

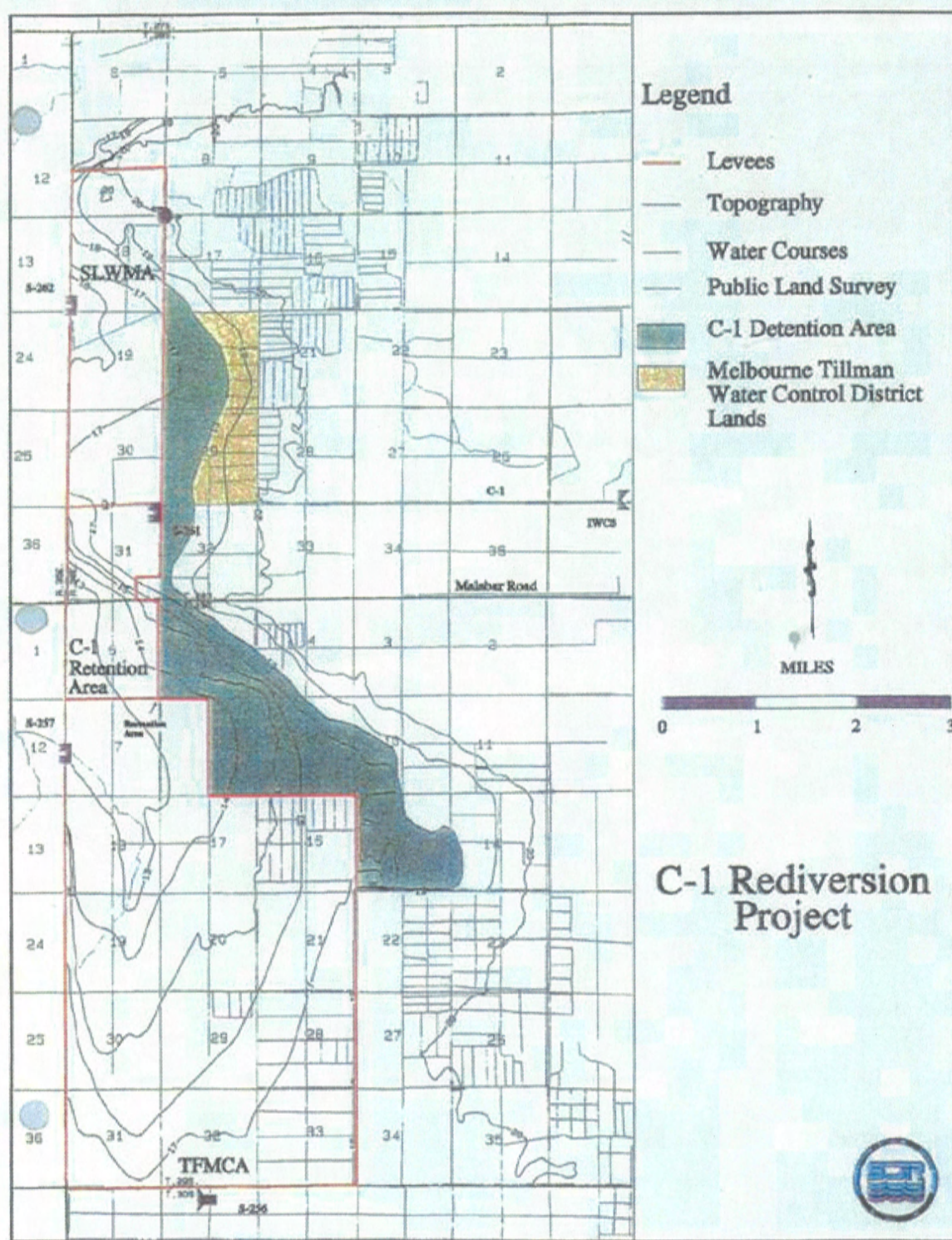
Section 206, WRDA 1996 (P.L. 104-303), Aquatic Ecosystem Restoration.

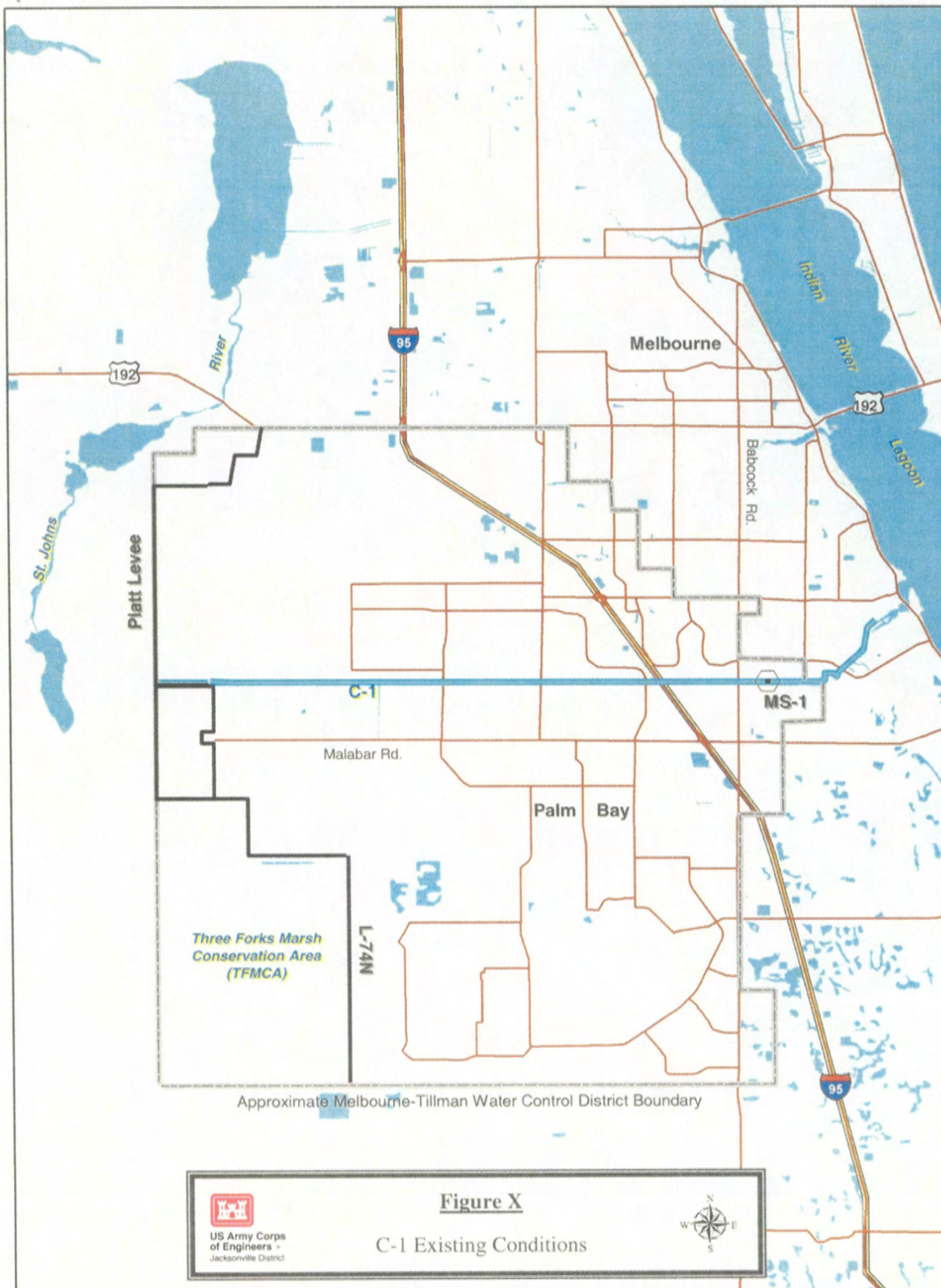
1.2 PROJECT LOCATION.

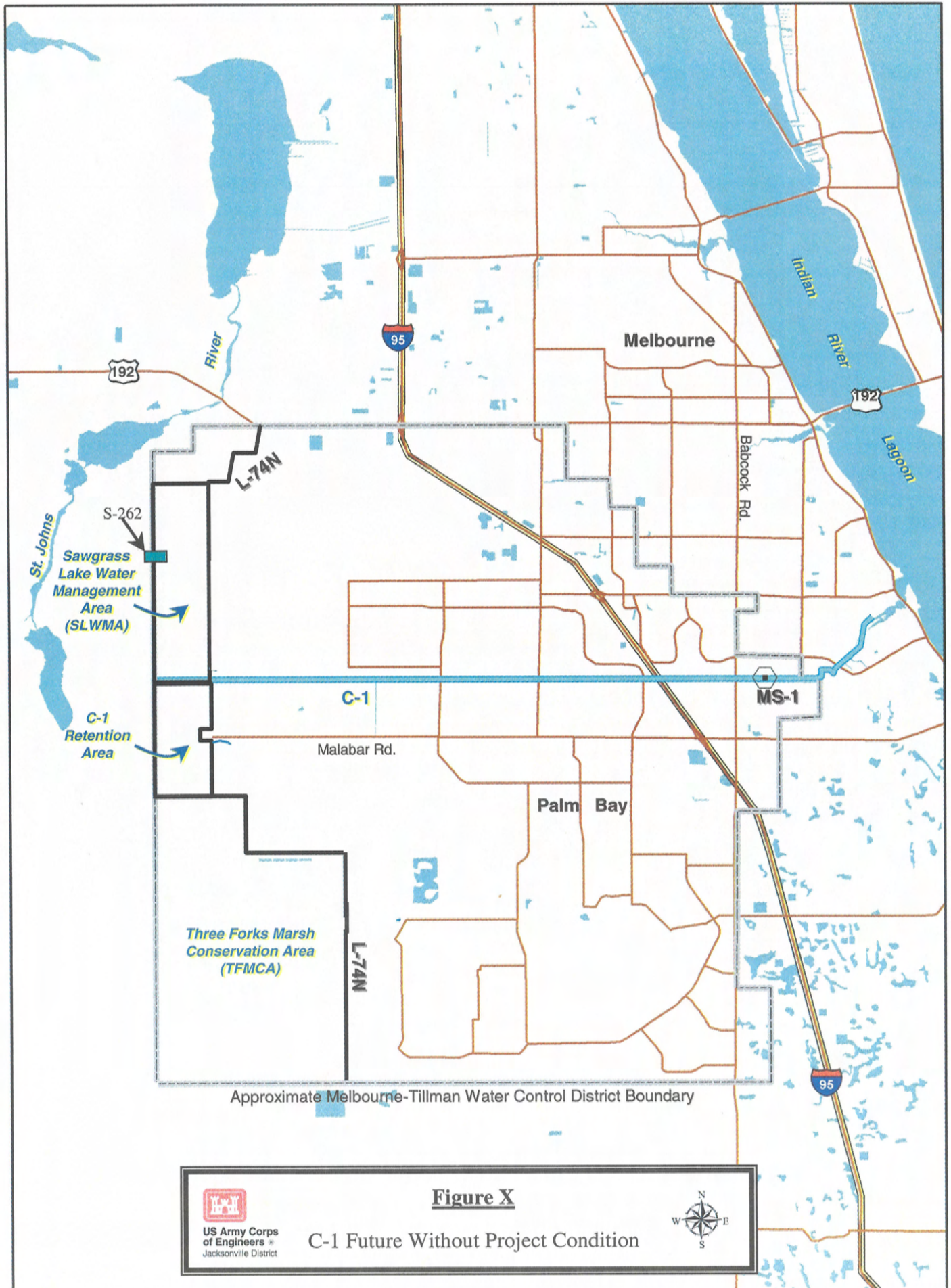
The work site for the construction of the Intermediate Water Control Structure (IWCS, a.k.a. MS-2) is located in the course of C-1 channel, approximately three miles West of the current location of the existing Water Control Structure MS-1. MS-1 is located at the Eastern most terminus of C-1, where C-1 empties into Turkey Creek and thence into Indian River Lagoon (IRL).

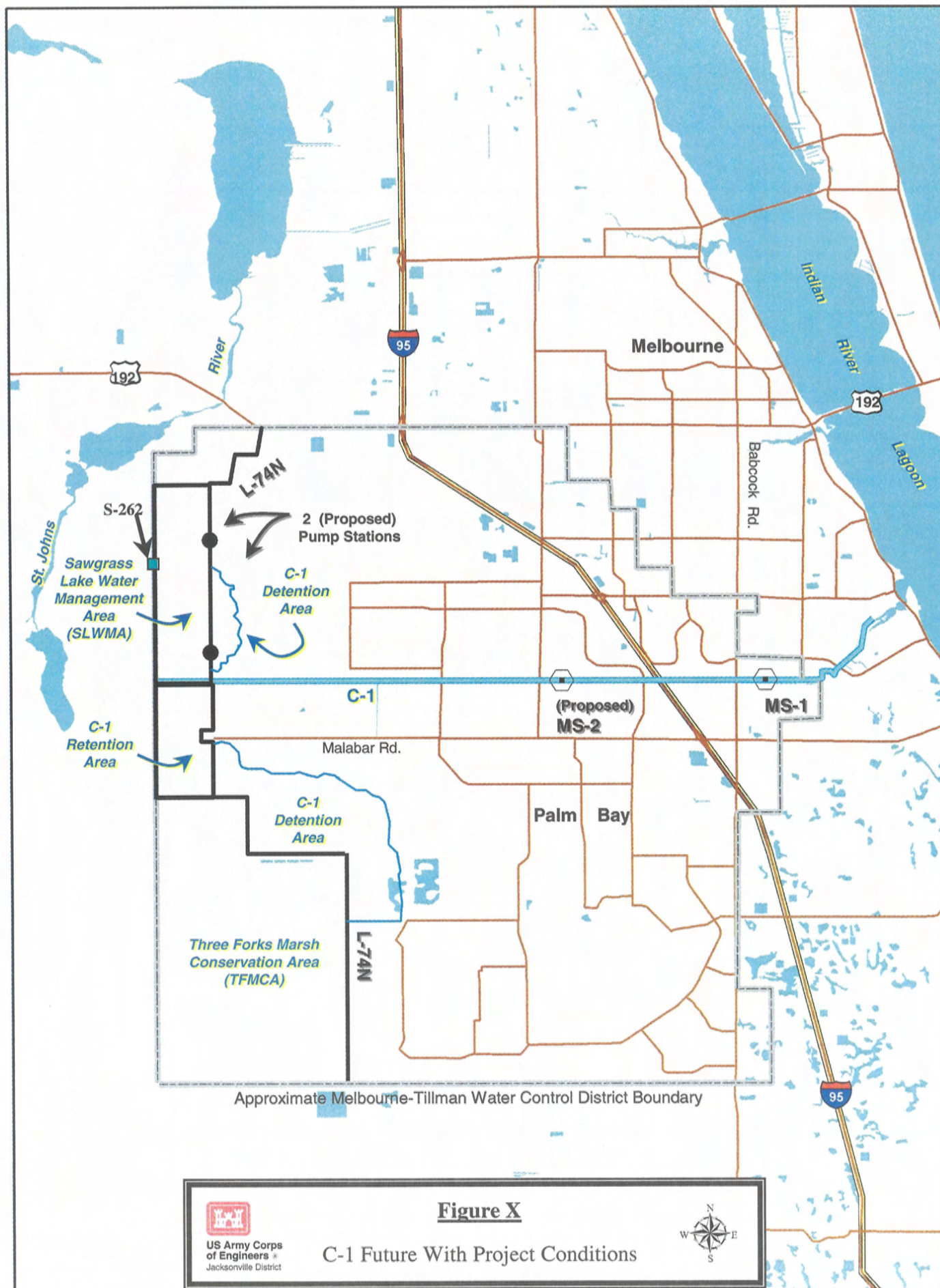
Channel C-1 is located near coastal Brevard County, which is approximately midway down the Atlantic Coast of Florida. C-1 traverses the city of Palm Bay before becoming Turkey Creek, finally flowing into the (IRL). Enclosure 1 shows the project location. The proposed Disposal Site is located immediately west of C-1 in the Sawgrass Lakes Water Management Area (SLWMA).

FIGURE 1: VICINITY MAP AND PLAN VIEW









1.3 PROJECT HISTORY

The project area includes a watershed covering 115 square miles. The predevelopment drainage area of 10,000 acres now encompasses over 60,000 acres (Sucsy and Morris, 1998). The drainage basin served by the C-1 Canal is bounded on the West by the St. Johns River basin and on the East by the central IRL. A coastal ridge runs north-south bisecting the C-1 basin. Historically, rainfall would flow either to the St. Johns River or to the IRL depending on which side of the divide it fell. However, canals have been constructed on both sides of the divide diverting all rainfall into the C-1 Canal, which has significantly increased the volumes of freshwater water entering the IRL. The C-1 Canal is hydraulically connected to the IRL via Turkey Creek which traverses the city of Palm Bay. This canal provides flood protection to nearly 80,000 people. It carries soils, nutrients (nitrogen and phosphorus) and large volumes of freshwater from the historic St. Johns River floodplain eastward to Turkey Creek and the IRL. It is estimated that 68 to 80 percent of the annual loadings of primary pollutants, and 90 percent of the annual freshwater entering the IRL is contributed by the C-1 Canal via Turkey Creek. These discharges have caused precipitous and sustained drops in salinities and have over-enriched the creek and lagoon with suspended matter and nutrients. Nutrient induced algal growth, dissolved organic and particulate matter runoff, and muck re-suspension are believed to have contributed to the impacts affecting the hard clam industry and to the loss of Seagrass in the lagoon. The IRL has historically supported an important commercial fishery of hard clams (*Mercenaria mercenaria*) in the vicinity of Turkey Creek. Additionally, Seagrass beds provide essential habitat and food for many species in the IRL. The increased discharges in freshwater into the IRL are believed to have caused intermittent mortality to hard clams. Further, since 1943, there has been an incremental loss of Seagrass coverage, from approximately 1,200 acres to 120 acres in the Melbourne-Grant area of the lagoon.

1.4 PROJECT NEED OR OPPORTUNITY.

The water currently being discharged into the C-1 canal and ultimately into the IRL is a mixture of urban and agricultural run-off, rain, and floodwaters. The resulting combination is extremely high in both particulate matter and nutrients. The large volumes of fresh water discharges combined with this mixture of pollutants have a detrimental effect on the estuarine system of the IRL. These factors have contributed to largely negative impacts on sea grasses, which are the historic source of primary productivity in the IRL and a vital habitat to a variety of species both commercially significant, such as sea trout and flounder, and endangered, such as manatees and green sea turtles. The high sediment load of this water has also negatively impacted Turkey Creek, causing a rapid deposition of muck along the channel bottom.

1.5 AGENCY GOAL OR OBJECTIVE.

The primary goal of the U.S. Army Corps of Engineers (USACE) for this project is to restore the existing ecosystem and enhance water quality for the water bodies influenced by the outflow of channel C-1, Turkey Creek (TC) and thence Indian River Lagoon (IRL). This will be achieved by means of the planned IWCS (a.k.a. MS-2)

reducing the water flow and thus concomitantly reducing the freshwater dilution and nutrient induced eutrophication of Turkey Creek and IRL.

The central Indian River Lagoon is considered a critical area in need of water quality improvements and habitat restoration. The damages are mostly a result of the large freshwater discharges from Canal 1. Over 90% of the annual volume of fresh water and 68% to 80% of the annual loadings of primary pollutants discharged through Turkey Creek to the IRL are contributed by Canal 1. These discharges have (a) caused precipitous and sustained drops in salinities; (b) over-enriched the creek and lagoon with suspended matter and nutrients; and (3) created erosive velocities, which have damaged substantial portions of the embankment along Turkey Creek near the city of Palm Bay. (A separate Section 206 project is being performed for erosion control measures in Palm Bay). Nutrient induced algal growth, dissolved organic and particulate matter runoff, and muck re-suspension are believed to contribute significantly to the loss of Seagrass because they attenuate light. Since 1943 there has been an incremental loss of Seagrass coverage, from approximately 1,200 acres to 120 acres in the Melbourne – Grant area of the lagoon.

The proposed pollutant load reduction target for the C-1, MS-1 discharge is an 80% reduction of the total annual loadings of nutrients (TN, TP) and suspended matter. This target is based on the percentage of the estimated annual loadings from C-1 that need to be removed to achieve the lower sub-basin loading rates estimated for lesser developed IRL sub-basins (like Turnbull Hammock sub-basin). It is possible that this target could be refined based on the future determination of water quality requirements necessary for Seagrass growth.

As part of this work, approximately 1,700 acres at the C-1 Retention Area, and approximately 2,300 acres of the Sawgrass Lakes Water Management Area will be flooded as a result of the Rediversion of water from C-1 to the C-1 Detention Areas and the subsequent flow westwards of that water. The 4,000 acres are currently pasturelands and will be converted to wetlands as an incidental effect of the C-1 re-diversion. This will be considered as part of the effects of the C-1 Canal Rediversion.

1.6 RELATED ENVIRONMENTAL DOCUMENTS.

Prefinal report, Okeechobee Water Retention Areas Project Contract DAW17-98-D-0014.

Final USFWS Coordination Act Report . C-1 Re-Diversion Project, Brevard County, Florida.

2 ALTERNATIVES

2.1 EXISTING CONDITION/FUTURE WITHOUT PROJECT

The Existing Condition incorporates the approximately 100 sq. mile Melbourne-Tillman Water Control District (MTWCD) Basin, as it existed prior to 1986. The Boundary conditions and features that make up the existing condition include: (1) The improved Platt levee that forms the MTWCD western boundary, which separates the basin from the St. Johns River. (The Platt Levee provides St. Johns River flood protection to the MTWCD to an elevation of 22 ft. NGVD) (2) The C-1 canal and associated internal drainage system and the existing MS-1 structure that is limited to 3,000 cfs discharge into Turkey Creek.

Note: The L-74-N levee is not included in the existing condition model because it is not a completed feature. The interim portion of L-74-N that has been constructed south of C-1 Canal has not changed the basic drainage pattern within the MTWCD basin because gaps and culverts were left in key locations in the levee to provide existing basin drainage until completion of the Upper Basin Project. L-74-N is reflected in the future without condition.

This condition assumes all features of the Upper St. Johns River Basin Project and local improvements within MTWCD are complete. These features include the completion of (1) Three Forks Marsh Conservation Area; (2) C-1 Retention Area; (3) L-74-N completed up to US 192 with a gap at the C-1 Canal; (4) Construction of Sawgrass Lakes Water Management Area (SLWMA) by the St. Johns River Water Management District (SJRWMD). The discharge at MS-1 structure is limited to 3,000 cfs.

2.2 GENERAL PROJECT

Large freshwater releases from C-1 into IRL must be reduced in order to achieve aquatic restoration. The drainage basin served by C-1 is bounded on the west by the St. Johns River basin and on the East by the IRL. A coastal ridge that runs north-south bisects the C-1 basin. Historically, rainfall would flow to either the St. Johns River or the IRL depending on which side of the divide it fell on. However, landowners on both sides of the divide have constructed canals that convey all rainfall into the C-1 canal; this significantly increased the volumes of water entering the IRL. Some measure of control is afforded by structure MS-1 on Turkey Creek, but it is inadequate. The comprehensive plan is to re-divert much of the C-1 drainage to an inland retention area to be located west of Interstate 95. This will be accomplished by the construction of an Intermediate Water Control Structure (IWCS) on C-1, which would be located at the divide point. After waters enter the inland retention area they would then be pumped into a marsh treatment system (the Sawgrass Lakes Water Management Area [SLWMA]) to be treated before they

would be pumped into the St. Johns River marshes. The marshes would provide the filtration needed to remove pollutants before water drains into the St. Johns River.

The diversion of nutrient laden water will change the plant community in this site. Species that will become more common are *Pontederia cordata* (pickerelweed), *Sagittaria* spp. (arrowhead), *Typha* spp. (cattails), *Eichornia crassipes* (water hyacinth), *Pistia stratiotes* (water lettuce) and *Hydrilla verticillata* (hydrilla). Seed sources for all of these species are already present in the general area. The Melbourne-Tillman WCD manages the C-1 canal for aquatic vegetation so it will be a less likely seed source. It is more likely that the seed source will come from ditches present in the property carrying local runoff, animals transporting fragments/seeds and the occasional airboat.

Any excavate resulting from the construction of the MS-2 structure will be used on site for levee construction and will not be disposed of in the Sawgrass Lakes Water Management Area (SLWMA).

The St. Johns River Water Management District and the Melbourne-Tillman Water Control District currently carry out water quality monitoring to State of Florida standards, and will continue to do so. The water re-diverted by the MS-2 structure will raise the level of the C-1 Retention Area. There, the runoff water will remain for a longer hydroperiod than currently afforded by the outflow of C-1 into Turkey creek and the Indian River Lagoon (IRL). The runoff water will have received a longer treatment by the time it were to reach the St. Johns River than it would emptying into the IRL.

The main features are described as follows:

1. Construction of the IWCS which would detain floodwaters from the C-1 canal releasing less volumes of water at a more gradual rate, mimicking a more natural hydraulic regime.
2. Clean out and enlargement of C-1.
3. Increasing the capacity of the two square mile C-1 retention area and acquisition of additional interests in flowage easements within the lowlands west of Levee 74-N (L 74N).
4. Placement of a pump to discharge water from the area east of L74N into the SLWMA.
5. Construction of a small spillway structure (S-262) which would discharge the treated water from SLWMA into the St. Johns Marsh Conservation Area (SJMCA).

The sponsor is handling features 2,3, and 5. the remaining features are being completed under the authority of the Section 206 program. (See Table 4.2.2 for reasonable alternative comparison).

2.3 ALTERNATIVES

Initial plan formulation developed 14 potential alternatives. All but #2 and #7 were screened out for various reasons. Alternative #7 was screened out because it would

result in lower quality water being discharged to the St. Johns River, as Alt. #7 would not have the SLWMA to treat the water before discharge. The remaining alternative #2, along with the Existing Condition and Future Without Project Condition were modeled. These Conditions and Alternatives resulted in an increased impact to existing flood protection levels in portions of the MTWCD basin. These conditions and Alternative #2 were refined and modified.

The initial pre-modeling alternatives left were:

STRUCTURE + SLWMA

An Intermediate Water Control Structure (IWCS) also referred to as MS-2 would be installed in the C-1 canal approximately 3 miles west of the MS-1 structure. Pumps would be installed along L-74. Pumps would be used to transfer water from C-1 to the Sawgrass Lakes Water Management Area (SLWMA). The SLWMA and the C-1 detention would act as Storage Treatment Areas (STA). After the water passes through the SLWMA it would then discharge west into the St Johns River Marsh via structure S-262 (Weir).

STRUCTURE – NO SLWMA

Same as Alternative #1: Except there would be no SLWMA/L-74.

NO ACTION ALTERNATIVE (STATUS QUO)

Existing Conditions: Storm water from an approximately 100-sq. mile area is ultimately drained by the C-1 canal. The C-1 Canal is approximately 10 miles in length and runs in a west to east direction. The eastern terminus of the C-1 has a gated structure (MS-1) which discharges water into Turkey creek. Turkey Creek is a natural meandering stream that runs through the natural preserve owned by the city of Palm Bay. Turkey Creek then discharges east into the IRL. If no action is taken, current turbidity and salinity values will continue to exist.

Extensive modeling has shown that the revised Existing and Future Without Project Conditions and revised Alternative 2, ensure that the redirection of water back to the west does not impact existing flood protection levels. Revised Alternative #2 is renamed Alternative # 15.

2.3.1 ALTERNATIVE # 15 A

Consists of all the features of the Future Without Project Condition. Corps of Engineers (Corps) to install an Intermediate Water Control Structure (IWCS) also referred to as MS-2 in the C-1 canal approximately 3 miles west of the MS-1 structure. The MS-2 structure will be an **Obermeyer weir type structure**, which can provide a variable height to control the flow and will reduce the amount of fresh water flowing into Turkey Creek, and divert it back to the west to the C-1 Retention and Detention Areas. The Corps will install 2 electric pump(s) along L-74 with a total capacity of **300 cfs**. Pumps will be used to transfer water from C-1 Retention and

Detention Areas to the Sawgrass Lakes Water Management Area (SLWMA). The SLWMA will act as a wetlands treatment area. After the water has gone through the SLWMA it will discharge west into the St Johns River Marsh via structure S-262 (a series of gated and riser culverts).

2.3.2 ALTERNATIVE # 15 B

Consists of all the features of the Future Without Project Condition. Corps of Engineers (Corps) to install an Intermediate Water Control Structure (IWCS) also referred to as MS-2 in the C-1 canal approximately 3 miles west of the MS-1 structure. The MS-2 structure will be an **Obermeyer weir type structure**, which can provide a variable height to control the flow and will reduce the amount of fresh water flowing into Turkey Creek, and divert it back to the west to the C-1 Retention and Detention Areas. The Corps will install 2 electric pump(s) along L-74 with a total capacity of **200 cfs**. Pumps will be used to transfer water from C-1 Retention and Detention Areas to the Sawgrass Lakes Water Management Area (SLWMA). The SLWMA will act as a wetlands treatment area. After the water has gone through the SLWMA it will discharge west into the St Johns River Marsh via structure S-262 (a series of gated and riser culverts).

2.3.3 ALTERNATIVE #15 C

Consists of all the features of the Future Without Project Condition. Corps of Engineers (Corps) to install an Intermediate Water Control Structure (IWCS) also referred to as MS-2 in the C-1 canal approximately 3 miles west of the MS-1 structure. The MS-2 structure will be an **Obermeyer weir type structure**, which can provide a variable height to control the flow and will reduce the amount of fresh water flowing into Turkey Creek, and divert it back to the west to the C-1 Retention and Detention Areas. **A gravity structure** will be used to transfer water from C-1 Retention and Detention Areas to the Sawgrass Lakes Water Management Area (SLWMA). The SLWMA will act as a wetlands treatment area. After the water has gone through the SLWMA it will discharge west into the St Johns River Marsh via structure S-262 (a series of gated and riser culverts).

2.3.4 ALTERNATIVE #16 A

Consists of all the features of the Future Without Project Condition. Corps of Engineers (Corps) to install an Intermediate Water Control Structure (IWCS) also referred to as MS-2 in the C-1 canal approximately 3 miles west of the MS-1 structure. The MS-2 structure will be an **Obermeyer/fixed weir Hybrid type structure**, which can provide a variable height to control the flow and will reduce the amount of fresh water flowing into Turkey Creek, and divert it back to the west to the C-1 Retention and Detention Areas. The Corps will install 2 electric pump(s) along L-74 with a total capacity of **300 cfs**. Pumps will be used to transfer water from C-1 Retention and Detention Areas to the Sawgrass Lakes Water Management Area

(SLWMA). The SLWMA will act as a wetlands treatment area. After the water has gone through the SLWMA it will discharge west into the St Johns River Marsh via structure S-262 (a series of gated and riser culverts).

2.3.5 ALTERNATIVE # 16 B

Consists of all the features of the Future Without Project Condition. Corps of Engineers (Corps) to install an Intermediate Water Control Structure (IWCS) also referred to as MS-2 in the C-1 canal approximately 3 miles west of the MS-1 structure. The MS-2 structure will be an **Obermeyer/fixed weir Hybrid type structure**, which can provide a variable height to control the flow and will reduce the amount of fresh water flowing into Turkey Creek, and divert it back to the west to the C-1 Retention and Detention Areas. The Corps will install 2 electric pump(s) along L-74 with a total capacity of **200 cfs**. Pumps will be used to transfer water from C-1 Retention and Detention Areas to the Sawgrass Lakes Water Management Area (SLWMA). The SLWMA will act as a wetlands treatment area. After the water has gone through the SLWMA it will discharge west into the St Johns River Marsh via structure S-262 (a series of gated and riser culverts).

2.3.6 ALTERNATIVE # 16 C

Consists of all the features of the Future Without Project Condition. Corps of Engineers (Corps) to install an Intermediate Water Control Structure (IWCS) also referred to as MS-2 in the C-1 canal approximately 3 miles west of the MS-1 structure. The MS-2 structure will be an **Obermeyer/fixed weir Hybrid type structure**, which can provide a variable height to control the flow and will reduce the amount of fresh water flowing into Turkey Creek, and divert it back to the west to the C-1 Retention and Detention Areas. **A gravity structure** will be used to transfer water from C-1 Retention and Detention Areas to the Sawgrass Lakes Water Management Area (SLWMA). The SLWMA will act as a wetlands treatment area. After the water has gone through the SLWMA it will discharge west into the St Johns River Marsh via structure S-262 (a series of gated and riser culverts).

3 IMPACTED ENVIRONMENT

3.1 GENERAL ENVIRONMENTAL SETTING

The water currently being discharged into the C-1 man-made canal and ultimately into the IRL is a mixture of urban and agricultural run-off, rain, and floodwaters. The resulting combination is extremely high in both particulate matter and nutrients.

Additionally, the large volumes of fresh water discharges (which dilute the natural salinity of the water bodies) combined with this mixture of pollutants have a detrimental effect on the estuarine system of the IRL. These factors have contributed to largely negative impacts on sea grasses, which are the historic source of primary productivity in the IRL and a vital habitat to a variety of species both commercially significant, such as sea trout and flounder, and endangered, such as manatees and green sea turtles. The high sediment load of this water has also negatively impacted Turkey Creek, causing a rapid deposition of muck along the channel bottom.

3.2 VEGETATION

The area is dominated by marsh grasses such as cattail, spartina, spikerush, and rushes.

3.3 THREATENED AND ENDANGERED SPECIES

The Florida manatee, Bald eagle, Caracara, Wood stork, Snail kite, East indigo snake, and Whooping crane have been identified in the area.

3.4 WATER QUALITY

The IRL is actually a series of three estuarine systems, which are interconnected and extend approximately 155 miles from Ponce de Leon Inlet to Jupiter Inlet on Florida's east coast (see Figure 3). The IRL is narrow and relatively shallow with widths ranging from 0.2 –5.5 mi and an average depth of 4 feet. The Indian River Lagoon surface water area consists of 227,739 acres with 1,216,750 acres of surrounding basin. Of this, there are 23,089 acres of lagoon surface and 105,866 acres of watershed area in the North Central Indian River area. Biodiversity is high in the IRL and it has historically been an extremely productive ecosystem with the identification of approximately 2,200 different species in the lagoon system. Species of interest include manatees, dolphins, sea turtles and seahorses. However, commercial, residential and industrial development, along with agricultural runoff impact the IRL's water, sediment and habitat quality, and continue to threaten the delicate ecosystem. The IRL is quite different from most estuaries in that it has limited connections to the ocean, which inhibits the ability of the system to maintain the consistent water quality and concentrations that are found in most estuaries. In addition, a variety of sources contribute to the freshwater discharges into the IRL. However, as noted above, in the project area, 90 percent of the freshwater entering the IRL discharges from the C-1 Canal via Turkey Creek (see Figure 4). Salinities in the IRL can fluctuate dramatically during periods of rainfall resulting in extended periods of depressed salinities, which has ultimately caused declines in both the hard clam population and the Seagrass beds within the IRL.

As with all photosynthetic plants, sea grasses require sunlight to survive. Reductions in light levels may be attributed to dark water color associated with tannins and organic acids, turbidity from sedimentation and turbidity resulting indirectly, from the influence of nutrients on algae and plankton growth. Nitrogen and phosphorus are nutrients that have the greatest effect on sea grasses by encouraging the growth of algae and plankton, both of which reduce light levels. Freshwater discharges laden with these nutrients have over-enriched Turkey Creek and the lagoon with suspended matter and nutrients. Further, the erosive velocities of the high flows have damaged substantial portions of the embankment along Turkey Creek (See Photo 3), which in turn, adds to the sedimentation that occurs at the mouth of Turkey Creek. As a result, periodic dredging must be conducted to improve navigation and water quality. Dredging was conducted from 1998 through 2001 to remove material that wind and waves often transport from the creek into the IRL where it impacts water quality and sea grasses.

3.5 HISTORIC PROPERTIES

No significant archeological or historic resources were recorded in the work area, in accordance to the Florida State Historic Preservation Officer (SHPO) letter dated February 1, 2002, and found in Appendix C (page 35) of the EA.

4 ALTERNATIVE SELECTION

4.1 ISSUES AND BASIS FOR CHOICE

The C-1 water flow currently carries excessive freshwater discharges and residential pollutants through Turkey Creek to the Indian River Lagoon. The alternative providing the longest hydro period and treatment of waters would be preferred.

The alternatives considered diverge in the use of a gravity structure or active mechanical pumps, together with a Obermeyer Weir or a mixed Obermeyer Weir/Fixed Structure.

The Pure Obermeyer alternatives and Obermeyer/Fixed Structure Weir alternatives are considered not to have significant differences in flow. The second (mixed /hybrid) alternatives, are considered to provide a wider range of flow settings at less energy expenditure.

The pump alternatives are estimated to be preferable to the ones incorporating a gravity structure, as, although the pumps will require a higher level of energy expenditure, they provide a higher degree of control over the water flow into the SLWMA.

Modeling by the SJWMD revealed that there's no significant difference between the discharges effected by 300 cfs capacity and 200 cfs capacity pumps, but the latter would present a lower energy expenditure. Other beneficial factors considered are the creation of wetlands from current pasture lands by the westward pumping of water into 1,700 acres of the C-1 Retention Area and 2,300 acres of the Sawgrass Retention Area.

4.2 COMPARISON TABLES

4.2.1 ACTION ALTERNATIVES (engineering sound alternatives that would provide ecosystem benefits at a reasonable cost)

Alternative**	Intermediate Water Control Structure M-2 Obermeyer Weir*	Intermediate Water Control Structure M-2 Obermeyer Weir Hybrid*	2 Pumps Along L-74 (300 cfs Total pumping capacity)	2 Pumps Along L-74 (200 cfs Total pumping capacity)	Gravity Structure
#15A	X		X		
#15B	X			X	
#15C	X				X
#16A		X	X		
#16B		X		X	
#16C		X			X

* The Obermeyer Weir Hybrid differs from the Obermeyer Weir in that it consists of a smaller Obermeyer structure with a fixed weir overflow.

** Note that the following items are being constructed by the sponsor with or without the proposed action (alternative 15B) or other action alternatives:

1. Clean out and enlarge C-1
2. Increase the capacity of the 2 square mile C-1 retention area east of L74N
3. Construct small spillway structure (S-262) into St. Johns Marsh Conservation Area.

4.2.2 SIMULATED MS-1 DISCHARGE TO TURKEY CREEK

	Mean Annual Discharge, cfs	3.6 COMMENTS
Existing Condition, w/o TFMCA and SLWMA	136.2	Total drainage basin is approximately 100 sq.mi. (0% decreased discharge)
Alternative 15a, 300 cfs pump to SLWMA	64.5	The drainage is reduced by about 17 sq. mi. due to the formation of TFMCA and SLWMA. (52% decrease)
Alternative 15b, 200 cfs pump to SLWMA	66.6	The drainage is reduced by about 17 sq. mi. due to the formation of TFMCA and SLWMA. (51% decrease)
Alternative 15c, gravity flow to SLWMA (0 cfs pump)	107.7	The drainage is reduced by about 17 sq. mi. due to the formation of TFMCA and SLWMA. The mean annual discharge decreases from 136.2 cfs to 107.7 cfs is due primarily to the reduction of drainage area. (21% decr.)

(Results were similar for the 16a,16b,16c series of alternatives)

4.2.3 ALTERNATIVE COMPARISON

ALTERNATIVE (AS LISTED IN SECTION 2.3)	WATER FLOW DECREASE (% OF CURRENT)	SEAGRASS VALUE (HABITAT UNIT PER ACRE)	CLAMS VALUE (HABITAT UNIT PER ACRE)	FISH SPECIES VALUE (HABITAT UNIT PER ACRE)	TOTAL SUM HABITAT UNITS PER ACRE	USE OF ENER- GY	HU FOR 3200 ACRES
No Action/ Existing	0%	-2.7	-1	-1	-3.7	0	(- 11840)
15a	75%	+2	+0.8	+0.8	+3.6	-1.0	+8320
15b	74%	+2	+0.8	+0.8	+3.6	-0.5	+9920*
15c	70%	+1	+0.7	+0.7	+2.4	-0.0	+7680
16a	75%	+2	+0.8	+0.8	+3.6	-1.0	+8320
16b	74%	+2	+0.8	+0.8	+3.6	-0.5	+9920*
16c	70%	+1	+0.7	+0.7	+2.4	-0.0	+7680

* preferred

4.2.3 ADDITIONAL EFFECTS

4.2.3.1 C-1 Retention Area (conversion of 1,700 acres from pasture to wetland)

Impacts=> Alternatives II v	Endangered/ Threatened Species Habitat (acreage) (weight 4x) Snail Kite	Endangered/ Threatened Species Habitat (acreage) (weight 4x) Wood Stork	Endangered/ Threatened Species Habitat (acreage) (weight 4x) Whooping Crane	Wetlands (created/ destroyed) (weight 3x)	Water Treatment Effects (weight 2x)	Native Vegetation (weight 1x)	TOTAL:
Future w/o project	-68	-68	-68	-51	-34	-17	-306
Existing Conditions	0	0	0	0	0	0	0
15a	+340	+340	+340	+51	+34	+17	+1122
15b	+408	+408	+408	+51	+34	+17	+1326
15c	+272	+272	+272	+51	+34	+17	+918
16a	+340	+340	+340	+51	+34	+17	+1122
16b	+408	+408	+408	+51	+34	+17	+1326
16c	+272	+272	+272	+51	+34	+17	+918

4.2.3.2 Sawgrass Lakes Water Management Area (conversion of 2,300 acres from pasture to wetland)

Impacts=> Alternatives II v	Endangered/ Threatened Species Habitat (hundred acres) (weight 4x) Snail Kite	Endangered/ Threatened Species Habitat (hundred acres) (weight 4x) Wood Stork	Endangered/ Threatened Species Habitat (hundred acres) (weight 4x) Whooping Crane	Wetlands (created/ destroyed) (weight 3x)	Water Treatment Effects (weight 2x)	Native Vegetation (weight 1x)	TOTAL:
Future w/o project	-92	-92	-92	-69	-46	-23	-414
Existing Conditions	0	0	0	0	0	0	0
15a	+460	+460	+460	+69	+46	+23	+1518
15b	+552	+552	+552	+69	+46	+23	+1794
15c	+368	+368	+368	+69	+46	+23	+1242
16a	+460	+460	+460	+69	+46	+23	+1518
16b	+552	+552	+552	+69	+46	+23	+1794
16c	+368	+368	+368	+69	+46	+23	+1242

4.2.4 PREFERRED ALTERNATIVE

ALTERNATIVE # 15 B

Intermediate Water Control Structure (IWCS) C-1 canal approximately 3 miles west of the MS-1 structure. Consists of an **Obermeyer or hybrid/mixed Obermeyer weir type structure**, and 2 electric pumps installed along L-74 with a total capacity of **200 cfs.** to transfer water from C-1 Retention and Detention Areas to the Sawgrass Lakes Water Management Area (SLWMA). Either entails incidental creation of 4,000 acres of wetlands.

5 ENVIRONMENTAL EFFECTS

5.1 GENERAL ENVIRONMENTAL EFFECTS

The effect sought by the work is an increased hydro period for the water carried by C-1, pumping it from the C-1 Detention area and into channel C-2 and letting it flow into the Sawgrass Lake Water Management Area (SLWMA) and thence into the St. Johns River Marsh Area (SJRMA). This reduction in the West to East flow of water through Channel C-1 will result in a decreased flow of water crossing control structure MS-1 into Turkey Creek and thence into the Indian River Lagoon. Thus, the freshwater water flow re-diverted through the SLWMA will enjoy a longer hydro period to be treated by the vegetation in the SLWMA and the SJRMA. The decreased water flow proceeding across the MS-1 structure will result in decreased salinity dilution and decreased turbidity due to debris and sediment in both Turkey creek and Indian River Lagoon.

The selected alternative, will allow optimal active control of freshwater flow into Turkey Creek and the Indian River Lagoon, significantly reducing freshwater pollution of the estuary. It also will provide for pumping of C-1 water into the SLWMA via channel L-74, providing a higher hydro period in the SLWMA and the C-1 detention area. Thus, providing a longer time for these areas to act as Storage Treatment Areas (STA) for the water.

5.2 VEGETATION

The vegetation in the SLWMA will provide the needed biological treatment effect to the water pumped in. No adverse effect is expected to accrue on the vegetation within the course of the C-1 Channel itself. The decrease in salinity dilution of the waters of the adjoining Turkey Creek and IRL will result in the re-establishment of the higher salinity tolerant species historically found there such as oyster banks and sea grasses.

5.3 THREATENED AND ENDANGERED SPECIES

The water quality and thus the overall ecosystemic situation of the habitat of any endangered or threatened species present would be improved. No adverse effect of the actual work (pump and water management structure installation and operation) are expected to accrue on any endangered or threatened species or their critical habitats. Upon a reduction of the West to East C-1 water flow, the reduction in the flow of vegetable debris matter and in turbidity, affecting TL and IRL, will imply a benefit to the existing threatened and endangered species in those water bodies, such as the manatee (*Thrichechus manatus latirostris*). This will be due to the maintenance of high salinity gradients causing the re-growth of sea grasses which are the preferred fodder of the manatee.

The USFWS has also stated in its final CAR of January 2002, that the proposed work would have no benefit or detriment on the bald eagle population, and would actually benefit the wood stork, the snail kite, the crested caracara and especially the wood stork through the creation of new habitat for those species. As far as the Eastern indigo snake goes, its use of the SLWMA will decrease, but the species will be able to relocate to adjoining areas with drier conditions, with no detriment to the species.

Wetland habitat creation will directly benefit the Snail Kite, Wood Stork, and Whooping Crane.

5.4 WATER QUALITY

An overall water quality improvement is expected, since the construction of structure MS-2 will reduce the water flow from West to East through C-1 Channel and into TC and IRL, those water bodies will experience less turbidity and enhanced water quality, given that the amounts of sediment and debris transported in the water flow will be concomitantly less. Thus, water quality in C-1 Channel, TC, and the IRL will be enhanced.

Pumping of water through the SLWMA and on to the SJMCA will result in a longer hydroperiod for that water and thus, more treatment by the existing vegetation. St. John's River water quality can be expected to benefit from the work.

5.5 HISTORIC PROPERTIES

No significant archeological or historic resources were recorded in the work area, in accordance to the Florida State Historic Preservation Officer (SHPO) letter dated February 1, 2002, and found in Appendix C (page 24) of the EA.

5.6 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

5.6.1 NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

Environmental information on the project has been compiled and this Environmental Assessment has been prepared. The project is in compliance with the National Environmental Policy Act.

5.6.2 ENDANGERED SPECIES ACT OF 1973

Consultation with USFWS was completed on January 2002 (see Appendix C, FWS CAR). This project was fully coordinated under the Endangered Species Act and is therefore, in full compliance with the Act.

5.6.3 FISH AND WILDLIFE COORDINATION ACT OF 1958

This project has been coordinated with the U.S. Fish and Wildlife Service (USFWS). A Coordination Act Report (CAR) dated January 2002 was submitted by the USFWS. There has been no change in the project design since submittal of the CAR. This project is in full compliance with the Act.

5.6.4 NATIONAL HISTORIC PRESERVATION ACT OF 1966 (INTER ALIA)

(PL 89-665, the Archeology and Historic Preservation Act (PL 93-291), and executive order 11593) Archival research, and consultation with the Florida State Historic Preservation Officer (SHPO), have been conducted in accordance with the National Historic Preservation Act, as amended; the Archeological and Historic Preservation Act, as amended and Executive Order 11593. In a February 1, 2002 letter, the SHPO concurred with the Corps' no effect determination. The project will not affect historic properties included in or eligible for inclusion in the National Register of Historic places. The project is in compliance with each of these Federal laws.

5.6.5 CLEAN WATER ACT OF 1972

The project is in compliance with this Act. A Section 401 water quality certification is being requested from the Florida Department of Environmental Protection (DEP). All State water quality standards would be met. A Section 404(b) evaluation is included in this report as Appendix A.

5.6.6 CLEAN AIR ACT OF 1972

The exhaust emissions of the construction machinery employed will not violate any Federal, State, or local clean air standard. The operation of the pump (feature 4 of the work) will be primarily by electrical power, with Diesel-powered assistance only in the case of a high flow event. This would last at most four days and the emissions from the Diesel motor is not expected to violate any Federal, State, or local clean air standards. The Corps determination is that no impacts will take place and the work is consistent with the Clean Air Act of 1972.

5.6.7 COASTAL ZONE MANAGEMENT ACT OF 1972

Certification of consistency was granted on April 5, 2002.

5.6.8 FARMLAND PROTECTION POLICY ACT OF 1981

No prime or unique farmland would be impacted by implementation of this project. This act is not applicable.

5.6.9 WILD AND SCENIC RIVER ACT OF 1968

No designated Wild and Scenic river reaches would be affected by project related activities. This act is not applicable.

5.6.10 MARINE MAMMAL PROTECTION ACT OF 1972

Incorporation of the standard safe guards used to protect threatened or endangered species during dredging and disposal operations would also protect any marine mammals in the area, therefore, this project is in compliance with the Act.

5.6.11 ESTUARY PROTECTION ACT OF 1968

No designated estuary would be affected by project activities. This act is not applicable.

5.6.12 FEDERAL WATER PROJECT RECREATION ACT

Not applicable.

5.6.13 FISHERY CONSERVATION AND MANAGEMENT ACT OF 1976

The project is being coordinated with the National Marine Fisheries Service (NMFS) and is in compliance with the act at this point.

5.6.14 SUBMERGED LANDS ACT OF 1953

The project would occur on submerged lands of the State of Florida. The project has been coordinated with the State (FL Clearinghouse) and is in compliance with the act.

5.6.15 COASTAL BARRIER RESOURCES ACT AND COASTAL BARRIER IMPROVEMENT ACT OF 1990

There are no designated coastal barrier resources in the project area that would be affected by this project. These acts are not applicable.

5.6.16 RIVERS AND HARBORS ACT OF 1899

The proposed work would not obstruct navigable waters of the United States. The proposed action has been subject to the public notice, public hearing, and other evaluations normally conducted for activities subject to the act. The project is in full compliance.

5.6.17 ANADROMOUS FISH CONSERVATION ACT

Anadromous fish species would not be affected. The project is under coordination with the National Marine Fisheries Service and is at this point in compliance with the act.

5.6.18 MIGRATORY BIRD TREATY ACT AND MIGRATORY BIRD CONSERVATION ACT

No migratory birds would be affected by project activities. The project is in compliance with these acts.

5.6.19 MARINE PROTECTION, RESEARCH AND SANCTUARIES ACT

The Marine Protection, Research and Sanctuaries Act does not apply to this project.

5.6.20 MAGNUSON-STEVENSON FISHERY CONSERVATION AND MANAGEMENT ACT

The existing water control structure MS-1 acts as an effective barrier isolating any species from crossing over from TC to C-1 and vice versa. Not applicable.

5.6.21 E.O. 11990, PROTECTION OF WETLANDS

No wetlands would be affected by project activities. This is a project for the restoration of water quality to existing wetlands. This project is in compliance with the goals of this Executive Order.

5.6.22 E.O. 11988, FLOOD PLAIN MANAGEMENT

The project is in the base flood plain (100-year flood) and has been evaluated in accordance with this Executive Order. Project is in compliance.

5.6.23 E.O. 12898, ENVIRONMENTAL JUSTICE

Not applicable.

5.6.24 E.O. 13089, CORAL REEF PROTECTION

Not applicable.

5.6.25 E.O. 13112, INVASIVE SPECIES

No effect. Florida Department of Environmental Protection (DEP). Expressed concerns as to the possible re-seeding of the SLWMA and ultimately the SJWMA with invasive exotic vegetation. Mainly, *Hydrilla* spp. By letter dated October 31, 2002, the Corps responded, stating to the DEP that there is no direct connection between the C-1 detention/retention areas and the *Hydrilla* spp. seed sources in Lakes Sawgrass and Hell'n Blazes. Therefore, any *Hydrilla* spp. seeds introduced into C-1 by stormwater runoff would be receiving the seeds through inevitable airborne transmission, only avoidable through the eradication efforts ongoing at the seed sources. Additionally, at this time, the St. John's river Water Management District (SJRWMD) and the Melbourne-Tillman Water Control District (MTWCD) have ongoing invasive species monitoring and eradication programs in place for the SLWMA and the species monitoring and eradication programs in place for the SLWMA and the C-1 detention and retention areas, respectively.

5.7 IRRETRIEVABLE AND IRREVERSABLE COMMITMENT OF RESOURCES

No irretrievable and/or irreversible commitment of resources is contemplated. Existing upland habitat lost to flooding will be compensated by the concomitant creation/enhancement of wetland habitat. The normal salinity levels of TC and IRL will be restored, with the enhancement of that habitat for native original species.

5.8 CUMMULATIVE EFFECTS

None to accrue from the work. Deleterious environmental cumulative effects have been accruing historically from the effects of the water flow of C-1 driving sediment and muck into Turkey Creek, as well as diluting the IRL salinity levels. This project will reduce or eliminate those effects.

5.9 SELECTED ALTERNATIVE

ALTERNATIVE # 15 B

Intermediate Water Control Structure (IWCS) C-1 canal approximately 3 miles west of the MS-1 structure. Consists of an **Obermeyer weir type structure**, and 2 electric pumps installed along L-74 with a total capacity of **200 cfs.** to transfer water from C-1 Retention and Detention Areas to the Sawgrass Lakes Water Management Area (SLWMA). Incidental creation of 4,000 acres of wetlands.

6 LIST OF PREPARERS

PREPARERS

Esteban Jimenez, Biologist, Ivan Acosta, Civil/Environmental Engineer, David McCullough, Archeologist, Enid Gerena, Environmental Engineer.

7 PUBLIC INVOLVEMENT

7.1 SCOPING AND DRAFT EA

A scoping letter dated January 25, 2002 was issued for this action.

7.2 AGENCY COORDINATION

Any agency coordination letters are in Appendix C.

7.3 LIST OF RECIPIENTS

Copies of the draft EA are being mailed to the same mailing addresses as the scoping letter. A complete mailing list is in the scoping letter in Appendix C.

7.4 COMMENTS RECEIVED AND RESPONSE

- SJRWMD (Local Sponsor). In Support.
- Florida Fish and Wildlife Conservation Commission. Questions as to how the effects of the project were going to be monitored. Monitoring of fish and wildlife species is within the scope of the USFWS, NMFS, and state agencies. Not within the scope of the work carried out by the USACOE.
- Friends of Turkey Creek. Concerns on sand and muck collection and its effect on Turkey creek. Concerns on the interaction of the Intermediate Water Control structure and the existing MS-1 structure. Question as to any plans (not in the scope of this project) to environmentally enhance Turkey creek. Responded as to enhancement of TC not being at this time part of the project but an indirect consequence of MS-2 construction.
- R.C. Dix, Sr. (private Citizen). In support.
- Brevard County Board of County Commissioners. In support of either of the two action alternatives. Opposed to the no action alternative.
- Department of Community Affairs (FL Clearinghouse). Declared the action consistent with the FL Coastal Management Program.
- FL SHPO. Stated that no significant archeological or historic resources were found within the work site or would be affected by the work.
- Florida Department of Environmental Protection (DEP). Expressed concerns as to the possible re-seeding of the SLWMA and ultimately the SJWMA with invasive exotic vegetation. Mainly, *Hydrilla* spp. By letter dated October 31, 2002, the Corps responded, stating to the DEP that there is no direct connection between the C-1 detainment/retainment areas and the *Hydrilla* spp. seed sources in Lakes Sawgrass and Hell'n Blazes. Therefore, any *Hydrilla* spp. seeds introduced into C-1 by stormwater runoff would be receiving the seeds through inevitable airborne transmission, only avoidable through the eradication efforts ongoing at the seed sources. Additionally, at this time, the St. John's river Water Management District (SJRWMD) and the Melbourne-Tillman Water Control District (MTWCD) have ongoing invasive species monitoring and eradication programs in place for the SLWMA and the C-1 detention and retention areas, respectively.
- State of Florida Commissioner of Agriculture Charles H. Bronson. Letter dated October 11, 2002. In support of the project.

7.5 FURTHER DEVELOPMENTS AND COORDINATION

The EA was completed and prepared for signature on November 4, 2002. At that time, the sponsor decided to change the proposed design. The EA was then withdrawn and revised in view of the new proposals and modeling information made available in middle 2004. The innovations in design introduced to the project did not cause further environmental impacts and resulted in estimated additional beneficial creation of waters and wetlands.

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APPENDIX A - SECTION 404(B) EVALUATION

SECTION 404(b) EVALUATION

SECTION 206 AQUATIC ECOSYSTEM RESTORATION C-1 REDIVERSION PROJECT Brevard County, Florida

I. Project Description

a. Location. The work site for the construction of the (Intermediate) Water Control Structure MS-2 is located in the course of C-1 channel, approximately three miles West of the current location of the existing Water Control Structure MS-1. MS-1 is located at the Eastern most terminus of C-1, where C-1 empties into Turkey Creek and thence into Indian River Lagoon (IRL).

Channel C-1 is located near coastal Brevard County, which is approximately midway down the Atlantic Coast of Florida. C-1 traverses the city of Palm Bay before becoming Turkey Creek, finally flowing into the (IRL). Enclosure 1 shows the project location. The proposed Disposal Site is located immediately west of C-1 in the Sawgrass Lakes Water Management Area (SLWMA).

b. General Description. The proposed plan calls for construction of an Intermediate Water Control Structure (IWCS) referred to as MS-2, in the C-1 canal approximately 3 miles West of the MS-1 structure. Pumps would be installed along channel L-74, and used to transfer water from C-1 to the Sawgrass Lakes Water Management Area (SLWMA). The SLWMA and the C-1 detention would act as Storage Treatment Areas (STA). After the water passes through the SLWMA it would then discharge west into the St Johns River Marsh via structure S-262 (Weir).

c. Authority and Purpose. Section 206, WRDA 1996 (P.L. 104-303), Aquatic Ecosystem Restoration.

d. General Description of Dredged or Fill Material.

(1) General Characteristics of Material. Not applicable.

(2) Quantity of Material. Not applicable.

(3) Source of Material. Not applicable.

e. Description of the proposed Discharge Site.

(1) Location. Not applicable.

- (2) Size. Not applicable.
- (3) Type of Site. Not applicable.
- (4) Type of Habitat. Not applicable.
- (5) Timing and Duration of Discharge. Not applicable.
- f. Description of Disposal Method. Not applicable.

II. Factual Determinations

a. Physical Substrate Determinations.

- (1) Substrate Elevation and Slope. Not applicable.
- (2) Sediment Type. Not applicable.
- (3) Dredge/Fill Material Movement. Not applicable.
- (4) Physical Effects on Benthos. Not applicable.

b. Water Circulation, Fluctuation and Salinity Determination.

- (1) Water Column Effects. Not applicable.
- (2) Current Patterns and Circulation. Not applicable.
- (3) Normal Water Level Fluctuations and Salinity Gradients.

c. Suspended Particulate/Turbidity Determinations.

(1) Expected Changes in Suspended Particulates and Turbidity Levels in the Vicinity of the Disposal Site.

(2) Effects on the Chemical and Physical Properties of the Water Column.

(a) Light Penetration. Currently reduced by the turbidity in C-1, and TC.

(b) Dissolved Oxygen. Currently undetermined in the water bodies. However, fish, manatee, and green turtles were observed on the TC side of MS-1.

(c) Toxic Metals, Organics, and Pathogens. Currently undetermined in the water bodies. Any influx of the above via C-1 and into TL and IRL will be reduced by the reduced flow.

(d) Aesthetics. The construction of MS-2 will not alter the existing aesthetic panorama of the area.

(3) Effects on Biota.

(a) Primary Productivity and Photosynthesis. Improved WQ.

(b) Suspension/Filter Feeders. Improved WQ.

(c) Sight Feeders. Improved WQ.

d. Contaminant Determinations.

e. Aquatic Ecosystem and Organism Determinations.

(1) Effects on Plankton. Decreased turbidity. Improved WQ.

(2) Effects on Benthos. Decreased turbidity. Improved WQ.

(3) Effects on Nekton. Decreased turbidity. Improved WQ.

(3) Effects on the Aquatic Food Web. Decreased turbidity. Improved WQ.

(5) Effects on Special Aquatic Sites.

(a) Hardground and Coral Reef Communities. None.

(b) Sanctuaries and Refuges. None.

(c) Wetlands. None.

(d) Mud Flats. None

(e) Vegetated Shallows. None

(f) Riffle and Pool Complexes. None

(6) Endangered and Threatened Species. Will improve water quality in demonstrated West Indian manatee habitat.

(7) Other Wildlife. No adverse effect.

(8) Actions to Minimize Impacts. No adverse impacts.

f. Proposed Disposal Site Determinations.

(1) Mixing Zone Determination. Not applicable.

(2) Determination of Compliance with Applicable Water Quality Standards. Water Quality Certificate requested from FL DEP.

(3) Potential Effects on Human Use Characteristics.

(a) Municipal and Private Water Supplies. No effect.

(b) Recreational and Commercial Fisheries. No effect.

(c) Water Related Recreation. No effect.

(d) Aesthetics. No effect.

(e) Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves. No effect.

g. Determination of Cumulative Effects on the Aquatic Ecosystem. None.

h. Determination of Secondary Effects on the Aquatic Ecosystem. None.

III. Findings of Compliance or Non-compliance with the Restrictions on Discharge.

a. No significant adaptations of the guidelines were made relative to this evaluation.

b. No practicable alternative exists which meets the study objectives that does not involve discharge of fill into waters of the United States.

c. After consideration of disposal site dilution and dispersion, the discharge of fill materials will not cause or contribute to, violations of any applicable State water quality standards for Class III waters. The discharge operation will not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

d. The construction of Intermediate Water Control Structure will not jeopardize the continued existence of any species listed as threatened or endangered or result in the likelihood of destruction or adverse modification of any critical habitat as specified by the Endangered Species Act of 1973, as amended.

e. The placement of fill material will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreational and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic species and other wildlife will not be adversely affected. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values will not occur.

f. On the basis of the guidelines, the proposed disposal site for the discharge of dredged material is specified as complying with the requirements of these guidelines.

APPENDIX B - COASTAL ZONE MANAGEMENT CONSISTENCY



STATE OF FLORIDA
DEPARTMENT OF COMMUNITY AFFAIRS

"Dedicated to making Florida a better place to call home"

JEB BUSH
Governor

STEVEN M. SEIBERT
Secretary

April 5, 2002

Mr. James C. Duck
Chief, Planning Division
Department of the Army
Jacksonville District Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

RE: Department of the Army, Corps of Engineers - Project Scoping Request -
Ecosystem Restoration Report with Environmental Assessment for a Proposed C-
1 Canal Water Re-Diversion Project to Improve Water Quality in the Indian River
Lagoon Brevard County, Florida
SAI: FL200201301467C

Dear Mr. Duck:

The Florida State Clearinghouse, pursuant to Presidential Executive Order 12372, Gubernatorial Executive Order 95-359, the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464, as amended, and the National Environmental Policy Act, 42 U.S.C. §§ 4321, 4331-4335, 4341-4347, as amended, has coordinated a review of the above-referenced project.

The Department of Environmental Protection (DEP) recommends the inclusion of the information described on the enclosed DEP comments in the proposed environmental assessment. In addition, the applicant is advised that a Consumptive Use Permit issued by the St. Johns River Water Management District will be required for this project. A re-evaluation of the project will be conducted during the environmental documentation and permitting of this project. Please refer to the enclosed DEP comments.

2555 SHUMARD OAK BOULEVARD • TALLAHASSEE, FLORIDA 32399-2100

Phone: 850.488.8466/Suncom 278.8466 FAX: 850.921.0781/Suncom 291.0781

Internet address: <http://www.dca.state.fl.us>

CRITICAL STATE CONCERN FIELD OFFICE
2796 Overseas Highway, Suite 212
Marathon, Florida 33050-2227
(305) 289-2402

COMMUNITY PLANNING
2555 Shumard Oak Boulevard
Tallahassee, FL 32399-2100
(850) 488-2356

EMERGENCY MANAGEMENT
2575 Shumard Oak Boulevard
Tallahassee, FL 32399-2100
(850) 413-9969

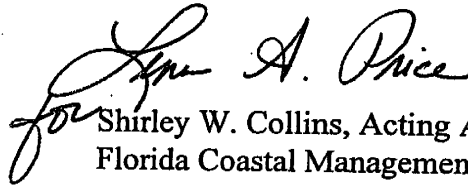
HOUSING & COMMUNITY DEVELOPMENT
2555 Shumard Oak Boulevard
Tallahassee, FL 32399-2100
(850) 488-7956

Mr. James C. Duck
April 5, 2002
Page Two

Based on the information contained in the referenced project and the enclosed comments provided by our reviewing agencies, the state has determined that the referenced project is consistent with the Florida Coastal Management Program.

Thank you for the opportunity to review this project. Should questions arise regarding this letter, please call Ms. Jasmin Raffington at (850) 922-5438.

Sincerely,

A handwritten signature in cursive script, appearing to read "Shirley W. Collins". The signature is written in dark ink and is positioned above the printed name and title.

Shirley W. Collins, Acting Administrator
Florida Coastal Management Program

SWC:jj

Enclosures

APPENDIX C - PERTINENT CORRESPONDENCE



REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

SAI # FL 200201301467

JAN 25 2002

TO WHOM IT MAY CONCERN:

The U.S. Army Corps of Engineers, Jacksonville District, is beginning to gather information which will aid in identifying issues and concerns to be addressed in an Ecosystem Restoration Report with Environmental Assessment for C-1 Re-diversion Project located in Brevard County, Florida (see enclosure 1).

The scope of this feasibility study is to evaluate the effects of the C-1 Re-diversion project. See enclosure 2 for project information. Environmental considerations will include the effects of the proposed action on wetlands, aesthetics, water quality, fish and wildlife habitats and values, endangered or threatened species, and historical or archeological resources.

We welcome your views, comments and information about resources, study objectives and important features within the study area, as well as any suggested improvements. If you know of anyone else who may wish to comment, please notify them of this opportunity. Letters of comment or inquiry should be addressed to the letterhead address to the attention of the Planning Division, Environmental Studies Section and should be received by this office within 30 days of the date of this letter.

Sincerely,

James C. Duck
Chief, Planning Division

Enclosures

RECEIVED
JAN 29 2002

State of Florida

Director
Office of Fed. Activities, E.P.A.
401 M Street SW
Washington, D.C. 30034-2610

Envir. Policy Sec., U.S. E.P.A.
Region IV, Atlanta Federal Center
100 Alabama St, SW
Atlanta, GA 30303-3104

Dir., Ofce of Env. Proj. Review
Depart. of Interior, Rm 4241
18th and C Streets, NW
Washington, D.C. 20240

Ntl Marine Fisheries Service
Envir. Assessment Branch
3500 Delwood Beach Road
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Ntl Marine Fisheries Service
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FL Dept of Ag & Consumer Ser.
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1720 Peach Tree Rd NW
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Florida State Clearinghouse
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St. Johns River Water Management District
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Advisory Council on Historic
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FL Fish & Wildlife Conserv Comm
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State Historic Preserv. Officer
FL Dept of State
500 South Bronough St
Tallahassee, FL 32399-0250

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St. Cloud, FL 34769

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Florida Fish & Wildlife Conservation Commission
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County Manager
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Director

Water Resources Manangement Seminole Tribe of Florida
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Lorida, FL 33857

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Ft. Plain, NY 13339

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Paul Gray
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Lorida, FL 33857



Jeb Bush
Governor

Department of Environmental Protection

Majority Stoneman Douglas Building
3900 Commonwealth Blvd.
Tallahassee, Florida 32399-3000

David B. Strickland
Secretary

February 28, 2002

Jasmin Raffington
State Clearinghouse
Department of Community Affairs
2555 Shumard Oak Boulevard
Tallahassee, Florida 32399-2100

RE: COE; Information Gathering for Ecosystem Restoration Report with EA for Proposed C1 Canal Water Re-diversion Project to Improve Water Quality in the Indian River Lagoon, Brevard County

SAI: FL200201301467C

Dear Ms. Raffington:

The Florida Department of Environmental Protection has completed its review of the above-referenced Canal water re-diversion project. We offer the following comments and suggestions:

The C-1 Canal passes through the City of Palm Bay, becomes Turkey Creek, and ultimately discharges into the Indian River Lagoon (IRL). This Canal is approximately ten miles in length. According to the materials provided, over 90 % of the annual volume of fresh water, and up to 80 % of the annual loadings of primary pollutants discharged through Turkey Creek to the IRL, are contributed by this Canal. The proposal also indicates that nutrient induced algal growth, dissolved organic and particulate matter runoff, and muck re-suspension are believed to have contributed to the loss of seagrass in the lagoon.

The Department is supportive of this project but would like to request that the following information be included in the Environmental Assessment (EA):

- Documentation that demonstrates that the decline in seagrass is due to the muck presence in the IRL.
- The location and map of the "inland retention area" mentioned in the materials.
- Name of responsible party in charge of the Sawgrass Lakes Water Management Area (SLWMA).
- Description of facility receiving the re-diverted water. Will the water be routed directly into Sawgrass Lake for treatment prior to discharge into the St. Johns Marsh?
- Justification of need to enlarge the C-1 Canal.
- Location of control structure, pipes, "inland retention area", and a map of all the

connections between all of the areas from the beginning of the C-1 Canal to the discharge into the IRL.

- Name of party that will be responsible for maintenance of the new facilities.
- Projected quantity of phosphorus and particulate matter entering the St. Johns Marsh after treatment in the SLWMA.
- Identification of all water quality constituents of concern that are proposed to enter the St. Johns Marsh after the water has been re-diverted.

The proposed project will require a Consumptive Use Permit from the St Johns River Water Management District. If the C-1 Canal is proposed for dredging, an Environmental Resource Permit will be required by the Department's Orlando Office, pursuant to Chapter 373, *Florida Statutes*.

Based on the information provided, the proposed project appears to be consistent with our authorities in the Florida Coastal Management Program. A re-evaluation of the project will be conducted during subsequent environmental documentation and permitting of this project. Future consistency will be based in part on adequate consideration of comments offered in this review.

Thank you for the opportunity to comment on this project. If I can be of further assistance, please contact me at (850) 487-2231.

Sincerely,



Marlane Castellanos
Office of Legislative and Governmental Affairs

MC/

COUNTY: BREVARD

DATE: 1/30/02

COMMENTS DUE DATE: 3/1/02

CLEARANCE DUE DATE: 3/31/02

Message:

SAI#: FL200201301467C

STATE AGENCIES

WATER MNGMNT. DISTRICTS

OPB POLICY UNITS

AGRICULTURE
COMMUNITY AFFAIRS
FISH & WILDLIFE CONSERV. COMM
STATE
TRANSPORTATION
X ENVIRONMENTAL PROTECTION

ST. JOHNS RIVER WMD

ENVIRONMENTAL POLICY/C & ED

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FEB 04 2002
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The attached document requires a Coastal Zone Management Act/Florida Coastal Management Program consistency evaluation and is categorized as one of the following:

- Federal Assistance to State or Local Government (15 CFR 930, Subpart F). Agencies are required to evaluate the consistency of the activity.
- X Direct Federal Activity (15 CFR 930, Subpart C). Federal Agencies are required to furnish a consistency determination for the State's concurrence or objection.
- Outer Continental Shelf Exploration, Development or Production Activities (15 CFR 930, Subpart E). Operators are required to provide a consistency certification for state concurrence/objection.
- Federal Licensing or Permitting Activity (15 CFR 930, Subpart D). Such projects will only be evaluated for consistency when there is not an analogous state license or permit.

Project Description:

The Army Corps of Engineers, Jacksonville District is gathering information to identify issues and concerns to be addressed in an Ecosystem Restoration Report with Environmental Assessment for a proposed C-1 Canal water re-diversion project in Brevard County, Florida. Three alternative courses of action to reduce pollutant containing fresh water flow into the Indian River Lagoon are offered for review by interested parties.

To: Florida State Clearinghouse
AGENCY CONTACT AND COORDINATOR (SCH)
2555 SHUMARD OAK BLVD
TALLAHASSEE, FLORIDA 32399-2100
(850) 414-6580 (SC 994-6580)
(850) 414-0479

EO. 12372/NEPA

- ☐ No Comment
- ☐ Comment Attached
- ☐ Not Applicable

Federal Consistency

- ☐ No Comment/Consistent
- ☒ Consistent/Comments Attached
- ☐ Inconsistent/Comments Attached
- ☐ Not Applicable

From:

Division/Bureau:

Dept. of Environmental Protection

Reviewer:

Maureen Castellano



Clearinghouse

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Description: The Army Corps of Engineers, Jacksonville District is gathering information to identify issues and concerns to be addressed in an Ecosystem Restoration Report with Environmental Assessment for a proposed C-1 Canal water re-diversion project in Brevard County, Florida. Three alternative courses of action to reduce pollutant containing fresh water flow into the Indian River Lagoon are offered for review by interested parties.

Keywords: C-1 Re-diversion project-Brevard County**Program:****Review Comments**

◀ 4/11 ▶

Agency: FISH and WILDLIFE COMMISSION**Date:** (mm/dd/yyyy)**Description:** NC by Steve Lau**Comment Type:**☐ Draft ☒ Final

Increasing the capacity of the two square mile C-1 retention area and acquisition of additional interests in flowage easements within the lowlands west of Levee 74-N (L 74N) has the potential for affecting architectural or archaeological resources. Therefore, we require a full and thorough description of this section of the proposed undertaking, and a more specific project location map that will enable us to locate the project area. A USGS 7.5-minute quadrangle with project boundaries is preferred. We look forward to future coordination between the Jacksonville District Army Corps of Engineers and this office with regards to this action

[help](#) | [411](#) | [feedback](#) | [directory](#)☒ email Governor Jeb Bush☐ Gov. Bush's E-Newsletter

Clearinghouse

STATE CLEARINGHOUSE[Home](#)[Home](#) > [My In-Box](#) > [Search Project](#) > **Add Agency Comments**[My In-Box](#)**User:** CINDY CRANICK, , Clearinghouse[New Project](#)**Project Information**[Search Project](#)**Project:** FL200201301467C[DB Maintenance](#)

Description: The Army Corps of Engineers, Jacksonville District is gathering information to identify issues and concerns to be addressed in an Ecosystem Restoration Report with Environmental Assessment for a proposed C-1 Canal water re-diversion project in Brevard County, Florida. Three alternative courses of action to reduce pollutant containing fresh water flow into the Indian River Lagoon are offered for review by interested parties.

[Help](#)**Keywords:** C-1 Re-diversion project-Brevard County

Public Area

Program:[Brochure](#)[Manual](#)**Review Comments**

5/11

Agency: STATE**Date:** (mm/dd/yyyy)**Description:**

Increasing the capacity of the two square mile C-1 retention area and acquisition of additional interests in flowage easements within the lowlands west of Levee 74-N (L 74N) has the potential for affecting architectural or archaeological resources. Therefore, we

Comment Type:☐ Draft ☒ Final**Save**

COUNTY: BREVARD

Rec'd 2/6/02

#2094

✓ 3/6

DATE: 1/30/02

COMMENTS DUE DATE: 3/1/02

CLEARANCE DUE DATE: 3/31/02

SAI#: FL200201301467C

STATE AGENCIES

WATER MNGMNT. DISTRICTS

OPB POLICY UNITS

AGRICULTURE
COMMUNITY AFFAIRS
FISH & WILDLIFE CONSERV. COMM
STATE
TRANSPORTATION
ENVIRONMENTAL PROTECTION

X ST. JOHNS RIVER WMD

ENVIRONMENTAL POLICY/C & ED

The attached document requires a Coastal Zone Management Act/Florida Coastal Management Program consistency evaluation and is categorized as one of the following:

- Federal Assistance to State or Local Government (15 CFR 930, Subpart F). Agencies are required to evaluate the consistency of the activity.
- X Direct Federal Activity (15 CFR 930, Subpart C). Federal Agencies are required to furnish a consistency determination for the State's concurrence or objection.
- Outer Continental Shelf Exploration, Development or Production Activities (15 CFR 930, Subpart E). Operators are required to provide a consistency certification for state concurrence/objection.
- Federal Licensing or Permitting Activity (15 CFR 930, Subpart D). Such projects will only be evaluated for consistency when there is not an analogous state license or permit.

Project Description:

The Army Corps of Engineers, Jacksonville District is gathering information to identify issues and concerns to be addressed in an Ecosystem Restoration Report with Environmental Assessment for a proposed C-1 Canal water re-diversion project in Brevard County, Florida. Three alternative courses of action to reduce pollutant containing fresh water flow into the Indian River Lagoon are offered for review by interested parties.

To: Florida State Clearinghouse

EO. 12372/NEPA

Federal Consistency

AGENCY CONTACT AND COORDINATOR (SCH)

2555 SHUMARD OAK BLVD

TALLAHASSEE, FLORIDA 32399-2100

(850) 414-6580 (SC 994-6580)

(850) 414-0479

☐ No Comment

☐ Comment Attached

☐ Not Applicable

☐ No Comment/Consistent

☒ Consistent/Comments Attached

☐ Inconsistent/Comments Attached

☐ Not Applicable

From:

Division/Bureau:

SRWMD/CCGA

Reviewer:

[Signature]



St. Johns River Water Management District

Kirby B. Green III, Executive Director • John R. Wehle, Assistant Executive Director

Post Office Box 1429 • Palatka, FL 32178-1429 • (386) 329-4500

March 4, 2002

Ms. Jasmin Raffington
Florida State Clearinghouse
Department of Community Affairs
2555 Shumard Oak Boulevard
Tallahassee, FL 32399-2100

Re: **SAI #:** FL200201301467C **OPP #:** 2094
Name of Project: USACE – Identification of Issues and Concerns for Ecosystem
Restoration Report and Environmental Assessment for Proposed C-1 Canal Water Re-
Diversion Project – Brevard County, Florida.

Dear Ms. Raffington:

Selected staff of the St. Johns River Water Management District (SJRWMD) have reviewed the above referenced project and offer the following comments regarding the District's areas of responsibility that include water quality, water supply, flood protection, and natural systems.

SJRWMD is the local sponsor for this proposed project and therefore supports its approval.

For more information concerning this project, contact Hector Herrera, Senior Project Manager, (386) 329-4327 at SJRWMD's Palatka Headquarters.

If you have any questions about our comments, please contact Dick Galantowicz of my staff at (386) 329-4436.

Sincerely,

A handwritten signature in black ink, appearing to read 'Linda L. Burnette', is written over a horizontal line.

Linda L. Burnette, Director
Office of Communications and Governmental Affairs

HH/REG

c: H. Herrera

GOVERNING BOARD

Duane Ottenstroer, CHAIRMAN

Ometrias D. Long, VICE CHAIRMAN

R. Clay Albright, SECRETARY

David G. Graham, TREASURER

COUNTY: BREVARD

DATE: 1/30/02

COMMENTS DUE DATE: 3/1/02

CLEARANCE DUE DATE: 3/31/02

Message:

SAI#: FL200201301467C

STATE AGENCIES

WATER MNGMNT. DISTRICTS

OPB POLICY UNITS

AGRICULTURE
COMMUNITY AFFAIRS
FISH & WILDLIFE CONSERV. COMM
STATE
TRANSPORTATION
X ENVIRONMENTAL PROTECTION

ST. JOHNS RIVER WMD

ENVIRONMENTAL POLICY/C & ED

RECEIVED
FEB 04 2002
OIP/OLGA

The attached document requires a Coastal Zone Management Act/Florida Coastal Management Program consistency evaluation and is categorized as one of the following:

Project Description:

The Army Corps of Engineers, Jacksonville District is gathering information to identify issues and concerns to be addressed in an Ecosystem Restoration Report with Environmental Assessment for a proposed C-1 Canal water re-diversion project in Brevard County, Florida. Three alternative courses of action to reduce pollutant containing fresh water flow into the Indian River Lagoon are offered for review by interested parties.

- Federal Assistance to State or Local Government (15 CFR 930, Subpart F). Agencies are required to evaluate the consistency of the activity.
- X Direct Federal Activity (15 CFR 930, Subpart C). Federal Agencies are required to furnish a consistency determination for the State's concurrence or objection.
- Outer Continental Shelf Exploration, Development or Production Activities (15 CFR 930, Subpart E). Operators are required to provide a consistency certification for state concurrence/objection.
- Federal Licensing or Permitting Activity (15 CFR 930, Subpart D). Such projects will only be evaluated for consistency when there is not an analogous state license or permit.

To: Florida State Clearinghouse
AGENCY CONTACT AND COORDINATOR (SCH)
2555 SHUMARD OAK BLVD
TALLAHASSEE, FLORIDA 32399-2100
(850) 414-6580 (SC 994-6580)
(850) 414-0479

EO: 12372/NEPA

Federal Consistency

- ☐ No Comment
- ☐ Comment Attached
- ☐ Not Applicable

- ☐ No Comment/Consistent
- ☒ Consistent/Comments Attached
- ☐ Inconsistent/Comments Attached
- ☐ Not Applicable

From:

Division/Bureau:

Dept. of Environmental Protection

Reviewer:

Marianne Castellano

2111

FEB-20-2002 15:16
COUNTY: BREVARD

FL DEPT AGRIC & CONS

850 488 0863 P.1
DATE: 1/30/02

COMMENTS DUE DATE: 3/1/02

CLEARANCE DUE DATE: 3/31/02

SAI#: FL200201301467C

Message:

STATE AGENCIES

WATER MNGMNT. DISTRICTS

OPB POLICY UNITS

X AGRICULTURE
COMMUNITY AFFAIRS
FISH & WILDLIFE CONSERV. COMM
STATE
TRANSPORTATION
ENVIRONMENTAL PROTECTION

ST. JOHNS RIVER WMD

ENVIRONMENTAL POLICY/C & ED

The attached document requires a Coastal Zone Management Act/Florida Coastal Management Program consistency evaluation and is categorized as one of the following:

- Federal Assistance to State or Local Government (15 CFR 930, Subpart F). Agencies are required to evaluate the consistency of the activity.
- X Direct Federal Activity (15 CFR 930, Subpart C). Federal Agencies are required to furnish a consistency determination for the State's concurrence or objection.
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Project Description:

The Army Corps of Engineers, Jacksonville District is gathering information to identify issues and concerns to be addressed in an Ecosystem Restoration Report with Environmental Assessment for a proposed C-1 Canal water re-diversion project in Brevard County, Florida. Three alternative courses of action to reduce pollutant containing fresh water flow into the Indian River Lagoon are offered for review by interested parties.

To: Florida State Clearinghouse

EO. 12372/NEPA

Federal Consistency

AGENCY CONTACT AND COORDINATOR (SCH)

2555 SHUMARD OAK BLVD

TALLAHASSEE, FLORIDA 32399-2100

(850) 414-6580 (SC 994-6580)

(850) 414-0479

☒ No Comment

☐ Comment Attached

☐ Not Applicable

☒ No Comment/Consistent

☐ Consistent/Comments Attached

☐ Inconsistent/Comments Attached

☐ Not Applicable

Jack P. Dodd, Planner
Division of Forestry
Forest Resource Planning &
Support Services Bureau
3125 Conner Blvd. Mail Stop 023
Tallahassee, FL 32399-1650

From:

Division/Bureau:

Reviewer:

Date:

03-01-02

FEB-08-2002 09:13

FDOT URBAN OFFICE

407 275 4188 P.02

COUNTY: BREVARD

DATE: 1/30/02

COMMENTS DUE DATE: 3/17/02

CLEARANCE DUE DATE: 3/31/02

Message:

SAI#: FL200201301467C

STATE AGENCIES

WATER MNGMNT. DISTRICTS

OPB POLICY UNITS

AGRICULTURE
COMMUNITY AFFAIRS
FISH & WILDLIFE CONSERV. COMM
STATE
X TRANSPORTATION
ENVIRONMENTAL PROTECTION

ST. JOHNS RIVER WMD

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To: Florida State Clearinghouse
AGENCY CONTACT AND COORDINATOR (SCH)
2555 SHUMARD OAK BLVD
TALLAHASSEE, FLORIDA 32399-2100
(850) 414-6580 (SC 994-6580)
(850) 414-0479

EO. 12372/NEPA

Federal Consistency

- ☒ No Comment
☐ Comment Attached
☐ Not Applicable

- ☒ No Comment/Consistent
☐ Consistent/Comments Attached
☐ Inconsistent/Comments Attached
☐ Not Applicable

From:

Division/Bureau: Department of Transportation Dist 5

Reviewer: Peter A. Fontana

SAI Routing Sheet

COUNTY: BREVARD

DATE: 01/30/2002

Message:

SAI#: FL200201301467C

PROJECT TO BE REVIEWED BY: (Div/Program)	ASSIGNED REVIEWERS (Print Last Name)	IS PROJECT LOCATED IN APPROVED DRI? (Circle Yes/No)				Is Project CONSISTENT w/ COMPLAN?		Is Project CONSISTENT w/ FCMP?		Do you have any COMMENTS on project?		DATE REVIEW COMPLETED	R S U M
		YES		NO		YES	NO	YES	NO	YES	NO		
		Is Project Consistent with DO?		Is Project DRI Scale?									
DCP	RWD	YES	NO	YES	NO							2/10/02	
2/1/02			Monitoring Letter?	Monitoring Letter?									
Date Rec'd		YES	NO	YES	NO								
Complete and forward to Div/Prog Below no later than: 3/1/02													
CMP	Jones	Wetlands?		Stormwater?								2-12-02	
2/1/02		YES	NO	YES	NO								
Date Rec'd		YES	NO	YES	NO								
Complete and forward to ACC Coordinator no later than: 3/1/02													

UNIT COORDINATORS for Intergovernmental Coordination and Review:

CMP COASTAL MANAGEMENT PROGRAM
DCP COMMUNITY PLANNING

Ms. VANESSA HOLMES

2555 SHUMARD OAK
BLVD
2555 SHUMARD OAK
BLVD

(850) 414-6563
(850) 488-2356

The attached document requires a Coastal Zone Management Act/Florida Coastal Management Program consistency evaluation and is categorized as one of the following:

- ☐ Federal Assistance to State or Local Government (15 CFR 930, Subpart F). Agencies are required to evaluate the consistency of the activity.
- ☒ Direct Federal Activity (15 CFR 930, Subpart C). Federal Agencies are required to furnish a consistency determination for the State's concurrence or objection.
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The Army Corps of Engineers, Jacksonville District is gathering information to identify issues and concerns to be addressed in a Ecosystem Restoration Report with Environmental Assessment for a proposed Canal water re-diversion project in Brevard County, Florida. Three alternative course action to reduce pollutant containing fresh flow into the Indian River Lagoon are offer review by interested parties.

EO. 12372/NEPA ☐ No Comment ☐ Comments Attached ☐ Not Applicable
Federal Consistency ☐ No Comment/Consistent ☐ Consistent/Comments Attached ☐ Inconsistent/Comments Attached

INSTRUCTIONS:

1. UNIT COORDINATORS are responsible for logging in, logging out, and hand-carrying/mailling project packages to the next reviewing unit on this form, or to the ACC if all review requirements have been met. Failure to meet internal suspense dates may result in loss of opportunity to comment on critical issues.
2. Requests for EXTENSIONS should be made prior to due date, especially if COMMENTS will be submitted. Contact your UNIT COORDINATOR, who will request the EXTENSION from the ACC.
3. Agency COMMENTS on SAIs will be sent to the State Clearinghouse (SCH) and should be prepared in LETTER format for the Secretary's signature. Forward the project package to the next review unit while your COMMENTS are being drafted. Coordinate your comments with other reviewers prior to finalizing.

FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION



JULIE K. MORRIS
Sarasota

DAVID K. MEEHAN
St. Petersburg

H.A. "HERKY" HUFFMAN
Deltona

JOHN D. ROO
Jacksonville

QUINTON L. HEDGEPEETH, DDS
Miami

EDWIN P. ROBERTS, DC
Pensacola

RODNEY BARRETO
Miami

ALLAN L. EGBERT, Ph.D., Executive Director
VICTOR J. HELLER, Assistant Executive Director

FLORIDA MARINE RESEARCH INSTITUTE
(727) 896-8626, SC

February 20, 2002

Mr. James C. Duck
Chief, Planning Division
Department of the Army
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Mr. Duck,

After reviewing the summary of the feasibility study to determine the effects of the C-1 re-diversion several comments/questions arise regarding how the impacts of the modifications as described in Alternative 2 would be handled. The return to somewhat historic flow levels through Turkey Creek via the re-diversion of water westward through the SLWMA to filter the agricultural and urban pollutants makes the most ecological sense. Questions arise, however, regarding how the diversion will impact fish and wildlife resources (animals and habitats) in Turkey Creek and the adjacent IRL as well as within the SLWMA. Is any pre- or post-monitoring planned to help assess community changes? Some of this information is available through the water management district and other state agencies, but little current community composition data is available for inside Turkey Creek. As part of the FWC, Fisheries Independent Monitoring program, our office has an ongoing program that collects fisheries data from the adjacent IRL. This data may be helpful in assessing impacts of the proposed re-diversion. Our staff also have the expertise in designing programs that could be applied to pre- and post-monitoring of the fish and wildlife resources within Turkey Creek. Finally, there are no descriptions regarding the potential impacts of the diversion on the aquifers.

Sincerely,

A handwritten signature in black ink, appearing to read "Richard Paperno".

Richard Paperno, Ph.D.
Florida Fish & Wildlife Conservation Commission
Florida Marine Research Institute
Indian River Field Laboratory
1220 Prospect Ave, Suite 285
Melbourne, Florida 32901
Tel (321)-984-4328
Fax (321)-984-4824
richard.paperno@fwc.state.fl.us

Friends of Turkey Creek
John Mongioi
809 Vance Circle NE
Palm Bay, FL 32905
February 22, 2002

Department of the Army
Jacksonville District Corps of Engineers
Attn: Planning Division, Environmental Studies Section
P.O. Box 4970
Jacksonville, FL 32232-0019

RE: C-1 Re-diversion project feedback

Dear Mr. Duck,

We have formed a group called "Friends of Turkey Creek" which is very concerned about Turkey Creek and its effects on the IRL (Indian River Lagoon). All of the members of our group live on different areas of Turkey Creek. We also spend a great deal of time on, and are very familiar with, the Indian River Lagoon. Some of us have lived here for over thirty years. Accordingly, we have seen the tremendous effect that the run-off waters from the C-1 canal have had on both Turkey Creek and the IRL. As environmentalists, it has been heart breaking to see the devastating affects that the pollutant and silt-laden run-off has had on these bodies of water. We continually see the daily detrimental effects on these waterways and the surrounding area, for this is after allour home.

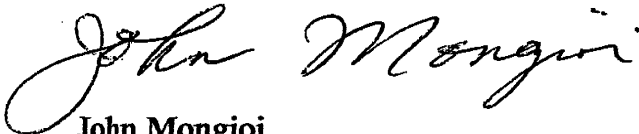
Our group would like to thank you for the opportunity to provide you with our views concerning the C-1 re-diversion project. Our concerns are as follows:

1. Does the proposed project allow for any means to collect and remove sand and muck that will collect in C-1 just prior to the MS-1 structure and before it escapes through MS-1 into Turkey Creek? Reducing the water flow into Turkey Creek will definitely help but it will only reduce the rate at which sand and muck come out through the MS-1 structure. As growth and development of the area continues, the rate of flow into Turkey Creek will rise again and the sand and muck will continue to flow, even if at a reduced rate, unless there is some plan to capture and remove it. We feel that is imperative to the long-term health of the estuary.
2. Will the proposed IWCS (Intermediate Water Control Structure) in the proposed project which is to be located 3 miles west of the existing MS-1 structure have any automated interaction with the MS-1 structure for the purpose of controlling the flow into Turkey Creek to a more gradual rate, mimicking a more natural hydraulic regime? If not, what will control the flow at MS-1 to obtain this more gradual rate?
3. Are there any plans for returning Turkey Creek to it's original condition once the C-1 Re-diversion project is complete? The flow out of C-1 has not only caused many areas of Turkey Creek to become shallow, it has actually caused many islands to form which were not originally there.

The Friends of Turkey Creek are in the process of studying Turkey Creek since the partial dredging in 2001. We are putting together present and past data on rainfall, flow rates, depth readings, soil samples in shallow areas, etc. and are sharing our findings with all concerned parties including Steve Robinson from your area. Our present activities and many years of first hand experience with the dynamics of the waterway can provide you with real data that can be helpful to you in making the project a great success for man and the environment.

Again, we appreciate the opportunity to communicate to you in regards to the outcome of the C-1 re-diversion project. We are optimistic and hopeful that you will address our concerns in your planning and implementation of the project and provide us with feedback concerning our questions. We are a very active group and would be more than willing to assist you in any way possible.

Sincerely,

A handwritten signature in cursive script that reads "John Mongioi". The signature is written in dark ink and is positioned above the printed name.

John Mongioi
(On behalf of The Friends of Turkey Creek)

The Army Corps of Engineers, Jacksonville District is gathering information to identify issues and concerns to be addressed in an Ecosystem Restoration Report with Environmental Assessment for a proposed C-1 Canal water re-diversion project in Brevard County, Florida. Three alternative courses of action to reduce

SAI# FL200201301467C

The above-described project was received by the Florida State Clearinghouse on 1/30/02, and has been forwarded to the appropriate reviewing agencies. The clearance letter and agency comments will be forwarded to you no later than 3/31/02, unless you are otherwise notified. Please refer to the above State Application Identifier (SAI) number in all written correspondence with the

have any questions,
at (850) 414-5495.

R. C. DIX, Sr.

Post Office Box 2634

Melbourne, FL 32902-2634
321-768-2676

Department of the army
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

2-01-02

Atten: Planning Division
Environmental Branch
Mr. James C. Duck

RE: C-1 Re-diversion Project, Brevard County, Florida.

Dear Mr. Duck:

I have read your letters dated 1-25-02 in regards to the above. I am glad to see that the time has come to consider this project.

I support this project and hope that we can finally stop discharging all of this fresh water into the Indian River Lagoon System.

Please keep me posted as this project progresses. Thanking you in advance. I am,

Sincerely,


R.C.DIX, SR.

RCDSR/dr
cc/file

DIVISIONS OF FLORIDA DEPARTMENT OF STATE
Office of the Secretary
Office of International Relations
Division of Elections
Division of Corporations
Division of Cultural Affairs
Division of Historical Resources
Division of Library and Information Services
Division of Licensing
Division of Administrative Services



MEMBER OF THE FLORIDA CAJ
State Board of Edu
Trustees of the Internal Improvement Trus
Administration Comm
Florida Land and Water Adjudicatory Comm
Siting
Division of Bond Fi
Department of Re
Department of Law Enforc
Department of Highway Safety and Motor Ve
Department of Veterans' A

FLORIDA DEPARTMENT OF STATE
Katherine Harris
Secretary of State
DIVISION OF HISTORICAL RESOURCES

Mr. James C. Duck
Planning Division, Environmental Branch
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32399-0250

February 1, 2002

RE: DHR Project File Number: 2002-493
DHR Received: January 28, 2002
Project Name: C-1 Re-diversion Project
Project Location: Brevard County, Florida

Dear Mr. Duck:

Our office has received and reviewed the above referenced project in accordance with Section 106 of the *National Historic Preservation Act of 1966* (Public Law 89-665), as amended in 1992, and *36 C.F.R., Part 800: Protection of Historic Properties*. The State Historic Preservation Officer is to advise and assist federal agencies when identifying historic properties (listed or eligible for listing, in the National Register of Historic Places), assessing effects upon them, and considering alternatives to avoid or reduce the project's effect on them.

Our review of the Florida Master Site File indicates that no significant archaeological or historical resources are recorded within the project area. Furthermore, because of the location and/or nature of the project it is unlikely that any such sites will be affected.

If there are any questions concerning our comments please contact Allison McCarthy, Historic Sites Specialist, by electronic mail at amccarthy@mail.dos.state.fl.us or at 850-245-6333 or 800-847-7278. Thank you for your interest in protecting Florida's historic properties.

Sincerely,

Janet Snyder Matthews, Ph.D., Director, and
State Historic Preservation Officer

500 S. Bronough Street • Tallahassee, FL 32399-0250 • <http://www.flheritage.com>

☐ Director's Office
(850) 245-6300 • FAX: 245-6435

☐ Archaeological Research
(850) 245-6444 • FAX: 245-6436

☒ Historic Preservation
(850) 245-6333 • FAX: 245-6437

☐ Historical Museums
(850) 245-6400 • FAX: 245-6438

☐ Palm Beach Regional Office
(561) 279-1475 • FAX: 279-1476

☐ St. Augustine Regional Office
(904) 825-5045 • FAX: 825-5044

☐ Tampa Regional Office
(813) 272-3843 • FAX: 272-2340

BREVARD *County*
BOARD OF COUNTY COMMISSIONERS

FLORIDA'S SPACE COAST

NANCY HIGGS, Commissioner, District 3
1311 E. New Haven Avenue, Melbourne, FL 32901

Telephone: (407) 952-6300
FAX (407) 952-6340



February 22, 2002

Mr. James C. Duck
Chief, Planning Division
Department of the Army
Jacksonville District Corps of Engineers
P. O. Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Duck:

Thank you for the opportunity to comment on the C-1 Re-diversion Project feasibility study.

Fresh water entering the Indian River Lagoon over the years has had a detrimental impact on salinity levels as well as sea grass coverage. Shellfish harvesting area Body F, which is in my district, has the highest number of shellfish leases in the County. Water quality and salinity levels are very important to the success of clam harvesting. The health of the lagoon is a valuable resource economically, commercially and aesthetically.

I would support either alternative 2 or 3. Alternative 1 is unacceptable.

Sincerely,

Nancy Higgs

Nancy Higgs
Brevard County Commissioner
District 3

NH:ba

MEMORANDUM FOR RECORD

SUBJECT: C-1 Rediversion.

1. Visited the office of the Melbourne-Tillman Water Control District. Present were Alfred B. Pennell (MTWCD), Troy Rice (SJRWMD – Indian River Lagoon Program), Russ Rote (COE), William Gallagher (COE) and E. Jimenez (COE).
2. Visited water control structures MS 1 and the prospective site of MS 2 to the west. Then Turkey Creek and Indian River Lagoon.
3. At this time, the storm water flow from the eastern half of the North-to-South levee separating the built up area from the SJWMD's St. Johns River floodplain to the West goes into the perpendicularly (West –to-East) laying C-1 channel. This crosses the MS 1 Water control structure, flows into Turkey Creek and thence into Indian River Lagoon (IRL). These presents the problem of debris and sediments being carried eastwards, erosion of the meandering banks of Turkey Creek, and dilution of salinity of IRL .
4. C-1 has a 300' to 400' Right-of-Way (ROW), currently vegetated up to 95% by mostly upland species, from MS2 to MS1. No vegetation is indicated westwards of MS 2.
5. Observations at MS 2 included olive brown flowing water with approximately 3% coverage of plant debris, which explained the presence of several tortoises (2) and manatees (3) in the area. Fish and fish larvae were also present. Bird feathers were also observed in the shoreline.
6. In the oxbows of Turkey Creek, 80% vegetation coverage (scrub oak, saw palmetto, cattail) was observed, but 20% of coverage was sand washed away by the water. A large (~2 ½') fish was seen (probably mullet). Only after we got to the IRL did we detect Red Mangrove stands, evidencing the dilution of IRL salinity by the water flowing through Turkey Creek and into the IRL.
7. The project entails pumping water back westwards from MS 2 and through the levee into the SJR's floodplain, providing a longer period of treatment and reducing the water (and concurrent sediment and debris) flow through Turkey Creek and into IRL. This will also alleviate the salinity dilution problem.

ESTEBAN JIMENEZ
Biologist

Draft

CESAJ-PD-PF

24 June 2002

MEMORANDUM FOR THE RECORD
TRIP REPORT

Subject: C-1 Canal Rediversion 206 ERR, 20 June 2002 Site Visit

1. Met with Non-Federal partners the St. John's River Water Management District and the Melbourne/Tillman Water Control District to tour the Canal. The following attended:

Name	Office	Phone
Bill Gallagher	CESAJ-PD-PF	232-1102
Russ Rote	CESAJ-PD-PF	232-2232
Esteban Jimenez	CESAJ-PD-EP	232-2115
Albert Pennell	Melbourne/Tillman Water Control District	321-723-7233
Troy Rice	St. John's River Water Management District	321-984-4950

2. Due to heavy rains, a culvert was out and was being repaired. Therefore, we could not get to the west parts of the project: L-74, Sawgrass Management areas etc.
3. Al Pennell gave us a good overview and history of the Melbourne/Tillman Water Control District and the canal system.

- The canal system was built in the 1920s. The area has had major urban development over the years. Which, as you would expect, has resulted in much more run-off and frequent street flooding. No structure flooding is occurring at this point. The increase in flow has also resulted in erosion of the canal with the sediment flowing into and depositing in Turkey Creek.

- When we toured the C-1 Canal, the water in the Canal was very muddy. Very heavy amounts of sediment were flowing through MS-1 and into Turkey Creek.

- Al said the Water Control District would not be able to clean out the sediment in C-1 without substantial assistance/funding for maybe 30 to 40 years.

4. Troy Rice joined us and we talked about the impact to Turkey Creek and Indian River Lagoon from C-1 Canal. The District has received 2 requests from the City of Palm Bay for a 206 project in Turkey Creek. One request was received in 1998 and one in May of 2002.

-The citizens think the sediment that is depositing in Turkey Creek is from C-1 Canal. And clearly a good part of it is. But some is also coming from eroding of Turkey Creek itself.

-When touring the Turkey Creek Sanctuary, we observed significant erosion of the banks of the creek. So, some of the sediment impacting Turkey Creek and flowing into Palm Bay is from the Turkey Creek as well as from C-1 Canal.

-Troy said the flow from Turkey Creek in to Palm Bay could be seen on occasion as a brown plume. It has caused fish kills in the past.

5. During our site visit, several Manatee were seen just down stream of MS-1. We started just west of Minton Rd. From there all the way through Turkey Creek Sanctuary the water was very muddy. It contained high levels of sediment.

ESTB 2002

OCT 31 2002

Planning Division
Environmental Branch

Mr. David F. Demmi
Environmental Specialist II
Florida Department of Environmental Protection
Bureau of Invasive Plant Management
2001 Homeland Garfield Road
Bartow, FL 33830

Dear Mr. Demmi:

Please consider the following replies to your concerns as expressed in your letter of September 18, 2002:

1. An aquatic plant management program is tailored to each individual case. In the case of the construction of the Intermediate Water Control Structure (IWCS), the U.S. Army Corps of Engineers (Corps) determined the runoff water collected in Canal-1 (C-1) will not be carrying any water from the Lake Sawgrass and Lake Hell'n Blazes area into the Sawgrass Lakes Water Management Area (SLWMA). This is because there is no existing hydrological connection between the Lake Sawgrass/Lake Hell'n Blazes and C-1. In addition, no dredged material from those *Hydrilla* seed sources will be deposited in C-1 or the C-1 detention area. Therefore, the Corps determines that an aquatic plant management program will not be required for this project (construction of the IWCS). Although the concerns of the U.S. Fish and Wildlife Service (FWS) are always considered by the Corps, in this case, the work involved will not result in an exotic plant infestation. In fact, any *Hydrilla* now out flowing into the Indian River Lagoon (IRL) through C-1 can only be deposited into the water bodies through the action of the wind blowing seed, as C-1 is not connected with the Lake Sawgrass and Lake Hell'n Blazes seed sources. Any amount of invasive seed in C-1 will be reduced by a similar factor to the reduction in the flow of water hypothetically carrying *Hydrilla* seed.

2. The C-1 Retention Area is currently subject to monitoring for the presence of invasive vegetation (and eradication of any by herbicide spraying) by the Melbourne-Tillman Water Control District. Such monitoring will continue in the future and will alert of any elevations in levels of invasive colonization.

The C-1 Project will take place only after the proposed Sawgrass Lake and Hell'n Blazes muck removal projects' product has been disposed of in the SLWMA, so as not to risk a hypothetical introduction of invasive vegetation to the SLWMA.

There are no plans or intentions for the C-1 project to alleviate or in any way affect the presence of nutrients and sedimentation going into the Lake Sawgrass or the Lake Hell'n Blazes.

At this time, the St. Johns River Water Management District (SJRWMD) carries on invasive detection and eradication activities in the Lake Sawgrass and Lake Hell'n Blazes areas. The Melbourne-Tillman Water Control District (MTWCD) does the same for C-1.

3. The Management methods available in the case of a hypothetical *Hydrilla* spp. invasion (based on what the monitoring reports indicate for species and density) are:

a. Water level manipulation - Dry out cells where hydrilla is found to reduce the biomass prior to tuber formation. This can also be used during the winter (with 2-3 days of freezing temperatures at night) to reduce floating plant populations.

b. Herbicides - some chemical control will be necessary, especially during the summer months. Again it is better to treat smaller infestations rather than large ones to decrease costs of herbicide and manpower.

c. Biocontrols - Use of *Hydrilla* fly species that feed on tubers and plants should be released in the project area if they are not already present.

The diversion of nutrient laden water will create conditions propitious for a change in the plant community in this site. Species that can be expected to become more common are *Pontederia cordata* (pickerelweed), *Sagittaria* spp. (arrowhead), *Typha* spp. (cattails), *Eichornia crassipes* (water hyacinth), *Pistia stratiotes* (water lettuce) and *Hydrilla verticillata* (hydrilla). Seed sources for all of these species are already present in the general area. The MTWCD manages C-1 for aquatic vegetation, and SJRWMD manages Lake Sawgrass and Lake Hell'n Blazes. These management programs are sufficient for invasive species control

and preclude the need for additional monitoring. It is more likely that the seed source will spread by air into the ditches carrying local runoff, or by animals transporting fragments/seeds and the occasional airboat spray, all of who are beyond the scope of control of a management program.

Any excavated material removed during the construction operations of the IWCS will be used on site for levee construction and will not be disposed of in the SLWMA.

The SJRWMD and the MTWCD currently carry out water quality monitoring according to State of Florida standards, and will continue to do so. The water re-diverted by the IWCS will raise the level of the water C-1 Retention Area. Therefore, the runoff water will remain for a longer hydroperiod than currently afforded by the outflow of C-1 into Turkey Creek and the IRL. The runoff water will have received a longer treatment by the time it reaches the St. Johns River than it would emptying into the IRL.

We hope this letter addresses your concerns and that you agree with our determination about the C-1 Rediversion Project resulting in enormous ecological benefit to Turkey Creek and the IRL, while causing no adverse impact to the St. John's River Water Management Area and SLWMA. We also hope this coordination will help to streamline the process of obtaining Water Quality Certification for this project.

If you have any questions or comments, please contact Mr. Esteban Jimenez at 904-232-2115.

Sincerely,

James C. Duck
Chief, Planning Division

Copy Furnished:

Mr. Alfred B. Pennell, 5990 Minton Road, Palm Bay, Florida
32907

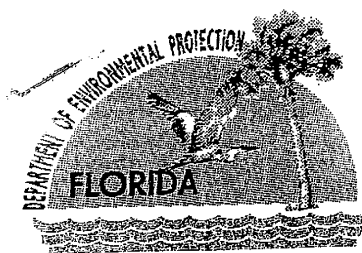
Mr. Hector Herrera, PE, P.O. Box 1429, Palatka, Florida
32178-1429

Bcc:

CESAJ-CO-OA (Catherine Johnson)
CESAJ-CO-OA(William Zattau)
CESAJ-DP-I (Steven Robinson)

[Handwritten signatures and initials]
Jiménez/CESAJ-PD-EP/2115/8/10/2012
Acosta/CESAJ-PD-EP
Mason/CESAJ-PD-E /0/29/02
Robinson/CESAJ-DP-I
Dijk/CESAJ-PD

L:/GROUPS/PDEP/JIMENEZ/HYDRILLA



Jeb Bush
Governor

Department of Environmental Protection

Bureau of Invasive Plant Management
2001 Homeland Garfield Road
Bartow, FL 33830
863-534-7074

David B. Struhs
Secretary

September 18, 2002

Mr. James C. Duck
Chief, Planning Division
Department of the Army
Jacksonville District Corp of Engineers
P.O. Box 4979
Jacksonville, Florida 32232-0019

Dear Mr. Duck:

Thank you for the opportunity to comment on the C-1 Re-diversion Project Feasibility Study. After reviewing the Draft Environmental Assessment (DEA), several comments/questions arise regarding section 8.0 Restoration Benefits and Recommendations. Section 8.2, Upper St. Johns River Basin (p. 32), discusses the possible colonization of SLWMA with emergent, free-floating, and submergent vegetation. The free-floating vegetation, *Eichhorina*, commonly known as water hyacinth, is one of the world's fastest growing plants. Water hyacinth is an exotic invasive species that has historically caused navigational, flooding and structural problems since the 1900's. The submergent vegetation is identified as *Hydrilla*. The source of *Hydrilla* described on p.32 involves the deposition of dredged material from Lakes Sawgrass and Hell'n Blazes, which has extensive infestations of this exotic invasive species. Concerns are warranted that *Hydrilla* may infest and spread through the re-circulation of water with the C-1 Retention Basin and discharge into the SJMCA.

Hydrilla is a submersed invasive species that can form dense mats at the water's surface hampering flood control, jamming against water control structures and lowering dissolved oxygen concentrations. In addition, *Hydrilla* may double the amount of sediments that accumulate in a water body.

The State of Florida, Bureau of Invasive Plant Management spent approximately \$13.2 million managing *Hydrilla* in public water bodies in 2001.

There is a recommendation that an aquatic plant management control program be developed to protect the resources that are not currently infested with *Hydrilla* on p.33.

Concerns related to this statement are:

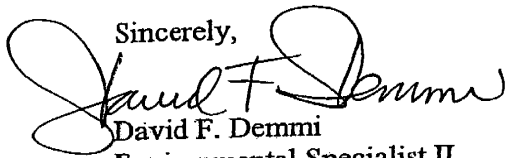
1. Why is an aquatic plant management program proposed for development and not already part of the EA?
2. What types of monitoring will be in place to ensure that a *Hydrilla* infestation does not occur?
3. If a *Hydrilla* infestation does occur, what management technologies will be employed to

Page Two
Letter to Mr. Duck
September 18, 2002

Intensive eradication programs need to be in place to prevent pest plants such as *Hydrilla* from becoming environmental and economic liabilities.

Again, thank you for the opportunity to comment on this project.

Sincerely,

A handwritten signature in black ink, appearing to read "David F. Demmi". The signature is fluid and cursive, with the first name "David" being more prominent and the last name "Demmi" following in a similar style.

David F. Demmi
Environmental Specialist II
Bureau of Invasive Plant Management
david.demmi@dep.state.fl.us



Florida Department of Agriculture and Consumer Services
CHARLES H. BRONSON, Commissioner
The Capitol • Tallahassee, FL 32399-0800

October 11, 2002

Please Respond to:

Mr. James C. Duck, Chief
Department of the Army
Jacksonville District Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

Dear Mr. Duck:

The Department supports the construction proposed by the Section 206 Aquatic Ecosystem Restoration C-1 Rediversion Project to further control the release of storm water into the Indian River Lagoon.

As noted in the project narrative, the sudden release of large quantities of storm water into the lagoon has killed hard clams being cultured or available for wild harvest in the vicinity of the discharge. In addition, salinity has been altered for long periods such that the growth of hard clams and other estuarine species has been negatively impacted for long periods of time. The Corp's project, designed to moderate the release of storm water or to store it for other uses, is a welcomed and much needed alternative to current practices.

In the event a public hearing is requested by other parties, please include Sherman Wilhelm on the notification list. Sherman is the Director of our Division of Aquaculture and can be contacted at 1203 Governors Square Boulevard, Fifth Floor, Tallahassee, Florida 32301, telephone: 850-488-4033, fax: 850-410-0849, e-mail: wilhels@doacs.state.fl.us.

Thank you for your continued commitment to the aquaculture industry in Florida.

Sincerely,

CHARLES H. BRONSON
COMMISSIONER OF AGRICULTURE

CHB/mm

cc: Bill Thompson, President, The Clam Bed
Sherman Wilhelm, Director, Division of Aquaculture

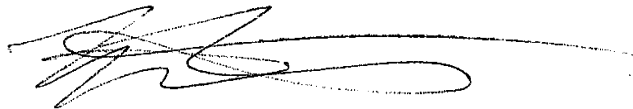


19 December 2002

MEMORANDUM FOR RECORD

SUBJECT: Section 206, C-1 Rediversion Project, Brevard County, Florida
CESAJ-OC Memorandum Dated 16 December 2002.

1. Today at 1600, I held a telephonic conference with Mr. Hector Herrera of The St. Johns River Water Management District (SJRWMD).
2. Mr. Herrera stated that although the SJRWMD did plan to construct Features 2, 3, and 5 of the project, it had not yet scheduled the work, it would assume 100% of the cost for it if and when it was scheduled, and the SJRWMD would not be seeking any Federal credit for that work.
3. Mr. Herrera also stated that the pump planned for Feature 4 of the work (together with Feature 1, the only parts of the project to be undertaken by the U.S. Army Corps of Engineers), would be operated by an electric motor with an additional diesel motor that would only run at most three to four days in the case of a high flow episode, and which would not discharge any pollutant into the atmosphere in violation of Federal, State, or local standards, laws, and regulations.



ESTEBAN JIMENEZ
Biologist, Special Projects Section

////////////////////////////////nothing follows //////////////////////////////////

APPENDIX D – CUMULATIVE EFFECTS ASSESSMENT

The goal of the work is an improvement of the ecological conditions of Turkey creek and Indian River Lagoon. The effectiveness of the work in so doing will be assessed by the local sponsor through monitoring of salinity gradients, turbidity, and the presence of saltwater marsh species in IRL and TC.

The increased hydroperiod of stormwater through the SLWMA and the SJRMA will result in an improvement in water quality, due to the longer Biological water quality enhancement time.

This work is not expected to have any deleterious cumulative effects and will remedy the ongoing cumulative effects of saltwater dilution and sediment deposition in TC and IRL.

FINAL

**SECTION 206
AQUATIC ECOSYSTEM RESTORATION PROJECT**

**C-1 RE-DIVERSION PROJECT
BREVARD COUNTY, FLORIDA**

**U.S. Fish and Wildlife Service
Coordination Act Report**

January 2002

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1.0 INTRODUCTION

In 1987, the Florida Legislature enacted the Surface Water Improvement and Management Act (SWIM) (chapter 373.451-373.4595, F.S) to enhance the environmental and scenic value of Florida's surface waters (Sucsy and Morris, 1998). As a result, the Saint Johns River Water Management District (SJRWMD) and the South Florida Water Management District (SFWMD) developed a management plan for the Indian River Lagoon (IRL). The plan was completed in 1989 and revised in 1994.

The IRL SWIM plan specifically identifies salinity fluctuations within the IRL as a major water quality issue, which has had dramatic effects on the growth and maintenance of hard clams and seagrass. In an effort to reduce the freshwater discharges into the IRL, the C-1 Rediversion Project is being proposed as an aquatic ecosystem restoration project by the Jacksonville District of the U.S. Army Corps of Engineers (USACE). Located near coastal Brevard County, Florida, the plan will entail re-diverting stormwater runoff which currently flows into the central Indian River Lagoon via C-1 Canal to the St. Johns River (See Figures 1 & 2). This project is authorized under Section 206 of the Water Resources Development Act of 1996.

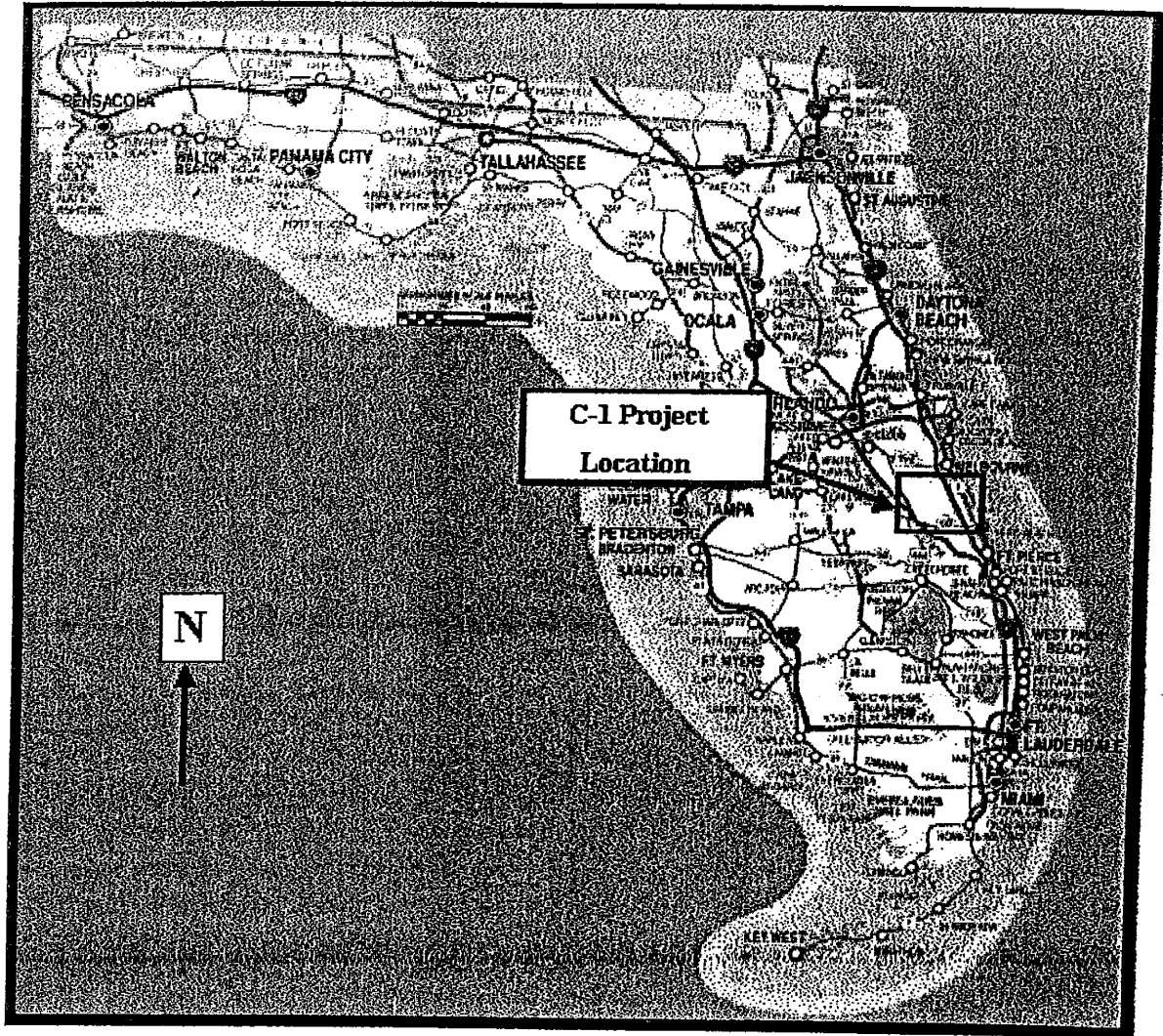
2.0 BACKGROUND

The project area includes a watershed covering 115 square miles. The predevelopment drainage area of 10,000 acres now encompasses over 60,000 acres (Sucsy and Morris, 1998). The drainage basin served by the C-1 Canal is bounded on the West by the St. Johns River basin and on the East by the central IRL. A coastal ridge runs north-south bisecting the C-1 basin. Historically, rainfall would flow either to the St. Johns River or to the IRL depending on which side of the divide it fell. However, canals have been constructed on both sides of the divide diverting all rainfall into the C-1 Canal, which has significantly increased the volumes of freshwater water entering the IRL. The C-1 Canal, which traverses the city of Palm Bay is hydraulically connected to the IRL via Turkey Creek. This canal provides flood protection to nearly 80,000 people. It carries soils, sediments, nutrients (nitrogen and phosphorus) and large volumes of freshwater from the historic St. Johns River watershed eastward to Turkey Creek and the IRL (USACOE, 1999).

It is estimated that 68 to 80 percent of the annual loadings of primary pollutants, and 90 percent of the annual freshwater entering the IRL is contributed by the C-1 Canal via Turkey Creek. These discharges have caused precipitous and sustained drops in salinities and have over-enriched the creek and lagoon with suspended matter and nutrients. Nutrient induced algal growth, dissolved organic and particulate matter runoff, and muck re-suspension are believed to have contributed to the impacts affecting the hard clam industry and to the loss of seagrass in the lagoon (USACOE, 1999). The IRL has historically supported an important commercial fishery of hard clams (*Mercenaria mercenaria*) in the vicinity of Turkey Creek (Steward & Higman, 1989). Additionally, seagrass beds provide essential habitat and food for many species in the IRL. The

increased discharges in freshwater into the IRL are believed to have caused intermittent mortality to hard clams. Further, since 1943, there has been an incremental loss of seagrass coverage, from approximately 1,200 acres to 120 acres in the Melbourne-Grant area of the lagoon (USACOE, 1999).

Figure 1: Location Map



3.0 PROJECT DESCRIPTION

The objectives of the proposed project are to 1) reduce the freshwater discharges from the C-1 Canal into the IRL which will restore a more natural salinity regime conducive to the maintenance and growth of seagrass and hard clams, 2) improve water quality, and 3) provide for conveyance of water to the St. Johns River. In order to achieve aquatic restoration of the IRL, the large freshwater releases from the C-1 Canal must be reduced. An existing water control structure, MS-1, consists of two (2) AMIL gates and two (2) radial gates, and is located at the eastern terminus of the C-1 canal enabling controlled

discharges into Turkey Creek (see Photo 1). Due to development in the Palm Bay area increasing the volume of stormwater runoff entering the C-1 Canal, discharges at the MS-1 structure, although infrequently exceeding the permitted discharge limit of 3,000 cubic feet per second (cfs), have frequently exceeded environmentally acceptable discharge thresholds as determined by seagrass and hard clam impact studies.

Photo 1: MS-1 Water Control Structure located on the C-1 Canal



The comprehensive plan is to re-divert much of the C-1 drainage to a 1,280-acre inland retention area (C-1 Retention Area) to be located west of Interstate 95 (see Figure 2). In order to accomplish this, an Intermediate Water Control Structure (IWCS), MS-2, will be constructed in the C-1 Canal in the proximity of the coastal ridge divide point (see Photo 2). This will consist of a two (or three)-bay gated concrete spillway capable of discharging up to 3,000 cfs. Construction of MS-2 will detain stormwater within the C-1 basin releasing less volume of water at a more gradual rate, mimicking a more natural hydraulic regime. Waters will enter the C-1 Retention Area via C-1 Canal. The present ground elevations in the C-1 Retention Area range from 17 feet NGVD in the northern portion to 13 ft. NGVD in the southern portion. The water will flow from the C-1 Retention Area, via a canal along the eastern toe of Levee-74N, the C-2R canal, to two pump stations totaling 380 cfs, where it will be pumped into a 2,240-acre wetland restoration area, known as the Sawgrass Lakes Water Management Area (SLWMA) providing water quality improvement to the stormwater prior to discharge to the St. Johns River. The SLWMA will retain 18 inches to 2 feet of water for a working elevation of 17.3 ft. NGVD. Water levels will be controlled and maintained, which will provide for maximum wetland management. During storm events, treated stormwater from the SLWMA will discharge through a gated culvert structure, S-262, into the St. Johns Marsh Conservation Area (SJMCA) and ultimately into the St. Johns River. Without the

project, the C-1 Retention Area and the SLWMA will remain unmanaged systems which are described in Sections 6.2.3 and 6.2.4, respectively.

Figure 2: C-1 Canal Rediversion Project

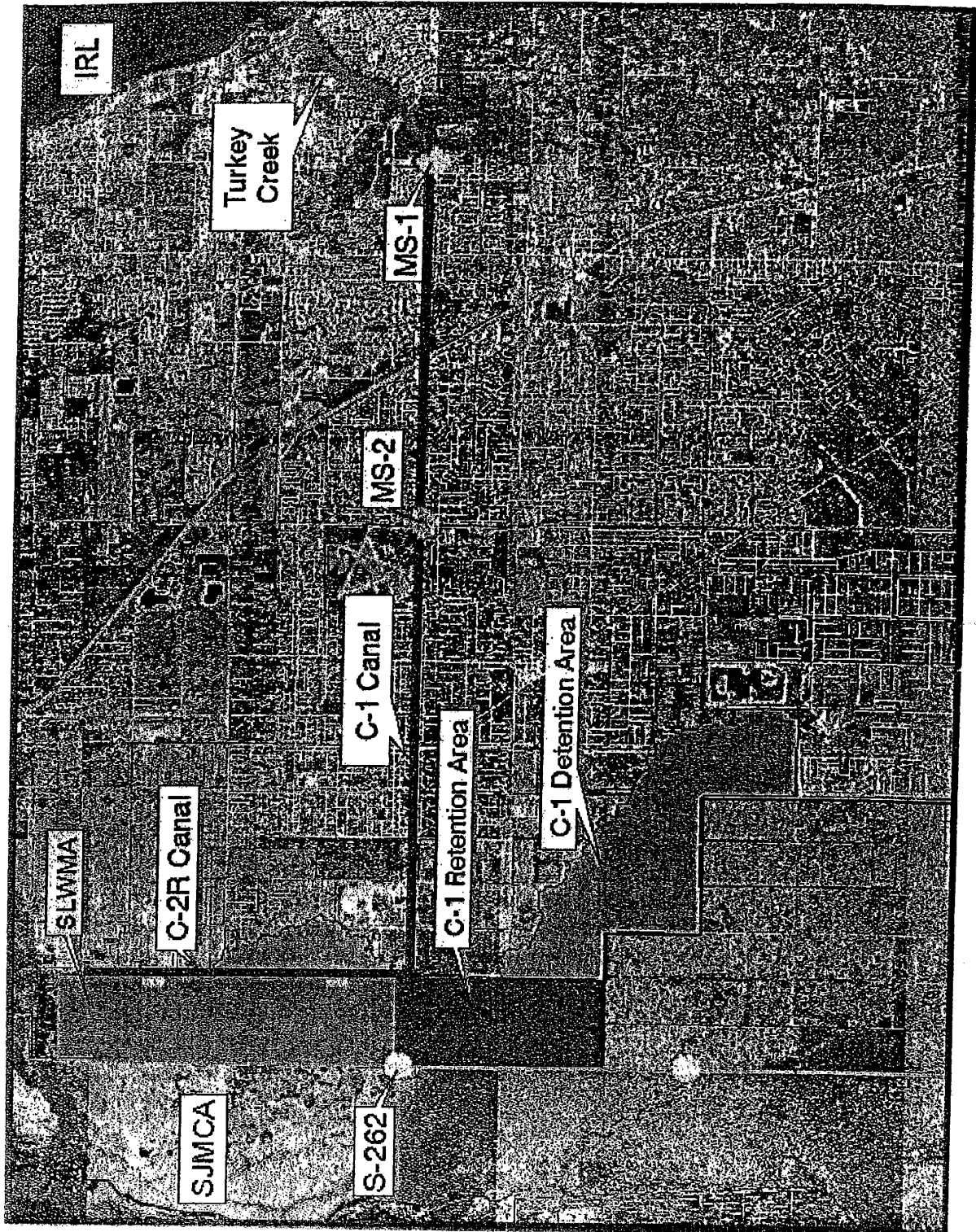


Figure courtesy of St. Johns River Water Management District

The SLWMA will be divided into three (3) cells which will be restored from grazed pasture to wetland habitat and used to provide water quality improvements for stormwater from the C-1 Canal. The central cell, which provides the least amount of effective wetland treatment area due to its topography, will be used as a dredged material disposal site for a separate ecosystem restoration project involving dredging of Lakes Sawgrass and Hell'n Blazes. This central cell will be used one time only as a dredged material disposal site resulting in an increase in the effective wetland treatment area due to the deposition of the dredged material. Upon completion of the dredging project, the three cells will be hydrated in order to initiate the wetland restoration process.

Photo 2: Location of Proposed MS-2 Water Control Structure on the C-1 Canal



4.0 HYDROLOGIC CRITERIA

Previous studies on *M. mercenaria* salinity tolerances or sensitivities have been conducted by Steward and Higman (1989) and others. Seagrass salinity tolerance studies have also been performed indicating similarities between *M. mercenaria* and six of the seven seagrass species (Steward, undated pub.). Seagrasses associated with the IRL include turtle grass (*Thalassia testudinum*), shoal grass (*Halodule wrightii*), manatee grass (*Syringodium filiforme*), widgeon grass (*Ruppia maritima*), paddle grass (*Halophila decipiens*), star grass (*Halophila englemanni*), and Johnson's seagrass (*Halophila johnsonii*). Of these, manatee grass, star grass, shoal grass and widgeon grass are the species identified in the North Central Indian River area of the IRL, which is the area of the IRL associated with this project (Woodward-Clyde, 1994). Additional information regarding seagrasses is presented in Section 6.2 of this document.

Studies document inhibited growth of seagrasses at salinities below 20 ppt. Subsequently it is desirable to maintain surface and bottom salinities in the IRL above 20 ppt. Studies regarding salinity responses to freshwater discharges indicate that a freshwater discharge in excess of 700 cfs can depress salinities below the 20 ppt standard. Subsequently it is desirable to maintain discharges below 700 cfs. (Steward and Higman, 1989; Sucsy and Morris, 1998). Based on continuous simulation model results, the proposed project will reduce the frequency of discharges greater than 400 cfs to no more than once every two years and discharges greater than 700 cfs to no more than once every three years. Anticipated reductions for the C-1 Canal are:

- A 67 percent reduction in the peak discharge generated by the mean annual storm.
- A 53 percent reduction in the runoff volume generated by the mean annual storm.
- A 44 percent reduction in the peak discharge generated by the 10 year storm.
- A 50 percent reduction in the monthly average base flow from C-1 Canal into Turkey Creek, and ultimately the IRL. This criterion is established for the sake of salinity management and pollutant load reduction. The reduced flow based on this criterion is still sufficient to protect the oligohaline characteristics of Turkey Creek's upper reach and the hydric hammock communities of the Turkey Creek Sanctuary.

5.0 PROJECT ALTERNATIVES

Alternative #1: Maintain existing conditions. Storm water from an approximately 100-sq. mile area drains into the C-1 Canal. The C-1 Canal is approximately 10 miles in length and runs in a west to east direction. The eastern terminus of the C-1 Canal has a gated structure (MS-1) which discharges water into Turkey Creek. Turkey Creek is a natural meandering stream that runs through the natural preserve owned by the City of Palm Bay. Turkey Creek then discharges east into the IRL.

Alternative #2: An intermediate water control structure, MS-2, would be constructed in the C-1 Canal approximately 3 miles west of the MS-1 structure. Pumps would be installed along Levee-74N, which would be used to transfer water from C-1 Retention Area, via the C-2R Canal, to the SLWMA. The SLWMA and the C-1 Retention Area would act as storage treatment areas. After the water passes through the SLWMA, it would then discharge west into the St. Johns River Marsh via structure, S-262, consisting of two (2) gated culverts and two (2) riser culverts. This is the preferred alternative of the Saint Johns River Water Management District (SJRWMD) and the USACE.

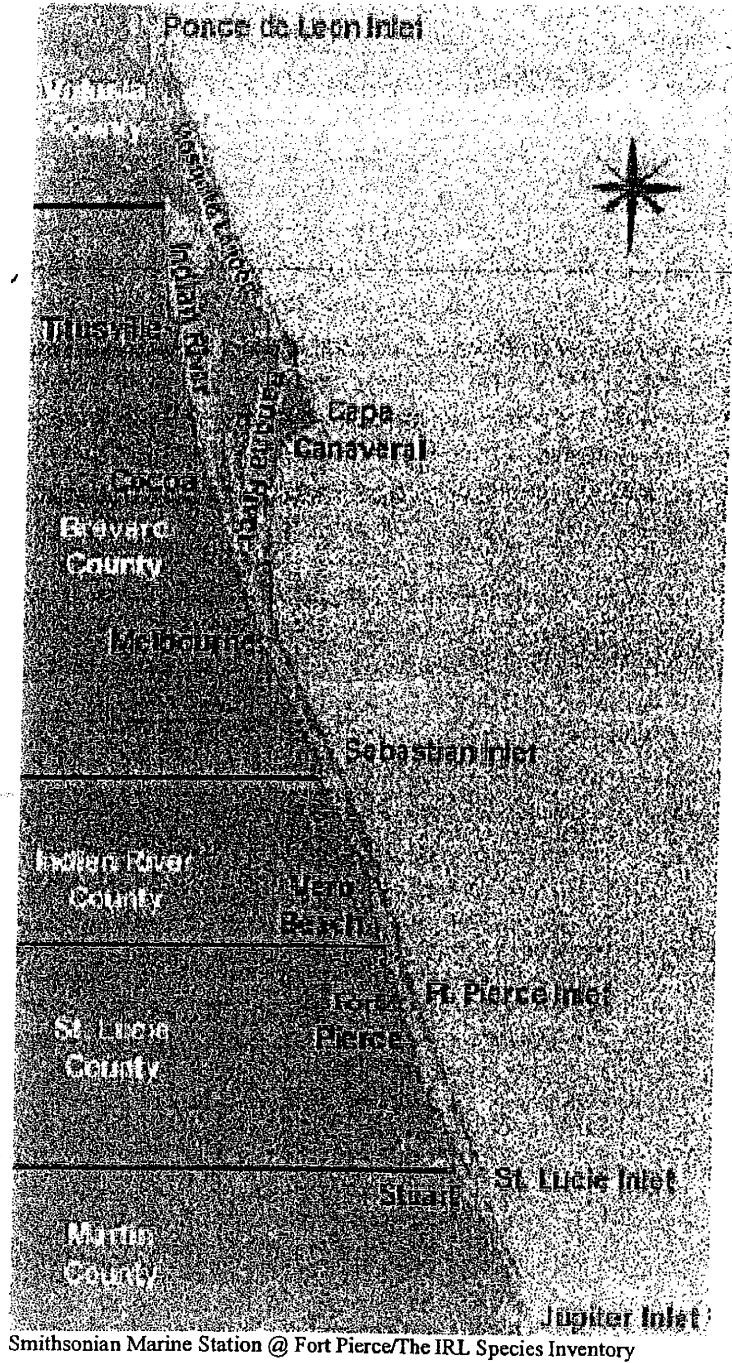
Alternative #3: This alternative would be identical to Alternative #2 with the exception that there would be no SLWMA/Levee-74.

6.0 AFFECTED ENVIRONMENT

6.1 WATER QUALITY

6.1.1 Indian River Lagoon and Turkey Creek. The IRL is actually a series of three estuarine systems, which are interconnected and extend approximately 155 miles from Ponce de Leon Inlet to Jupiter Inlet on Florida's east coast (see Figure 3). The IRL is narrow and relatively shallow with widths ranging from 0.2–5.5 mi and an average depth of 4 feet (Sucsy and Morris, 1998). The Indian River Lagoon surface water area consists of 227,739 acres with 1,216,750 acres of surrounding basin. Of this, there are 23,089 acres of lagoon surface and 105,866 acres of watershed area in the North Central Indian River area (Woodward-Clyde, 1994). Biodiversity is high in the IRL and it has historically been an extremely productive ecosystem with the identification of approximately 2,200 different species in the lagoon system (EPA, 1998). Species of interest include manatees, dolphins, sea turtles and seahorses. However, commercial, residential and industrial development, along with agricultural runoff impact the IRL's water, sediment and habitat quality, and continue to threaten the delicate ecosystem. The IRL is a lagoonal estuary in that it has limited connections to the ocean in contrast to rivermouth estuaries, which are typically well-connected and better flushed. Thus the IRL is fairly susceptible to anthropogenic loadings of pollutants and fresh water. (SJRWMD comment on draft CAR, 2001). In addition, a variety of sources contribute to the freshwater discharges into the IRL. However, as noted above, in the project area, 90 percent of the freshwater entering the IRL discharges from the C-1 Canal via Turkey Creek (see Figure 4). Salinities in the IRL can fluctuate dramatically during periods of rainfall resulting in extended periods of depressed salinities, which has ultimately caused declines in both the hard clam population and the seagrass beds within the IRL.

Figure 3: Indian River Lagoon



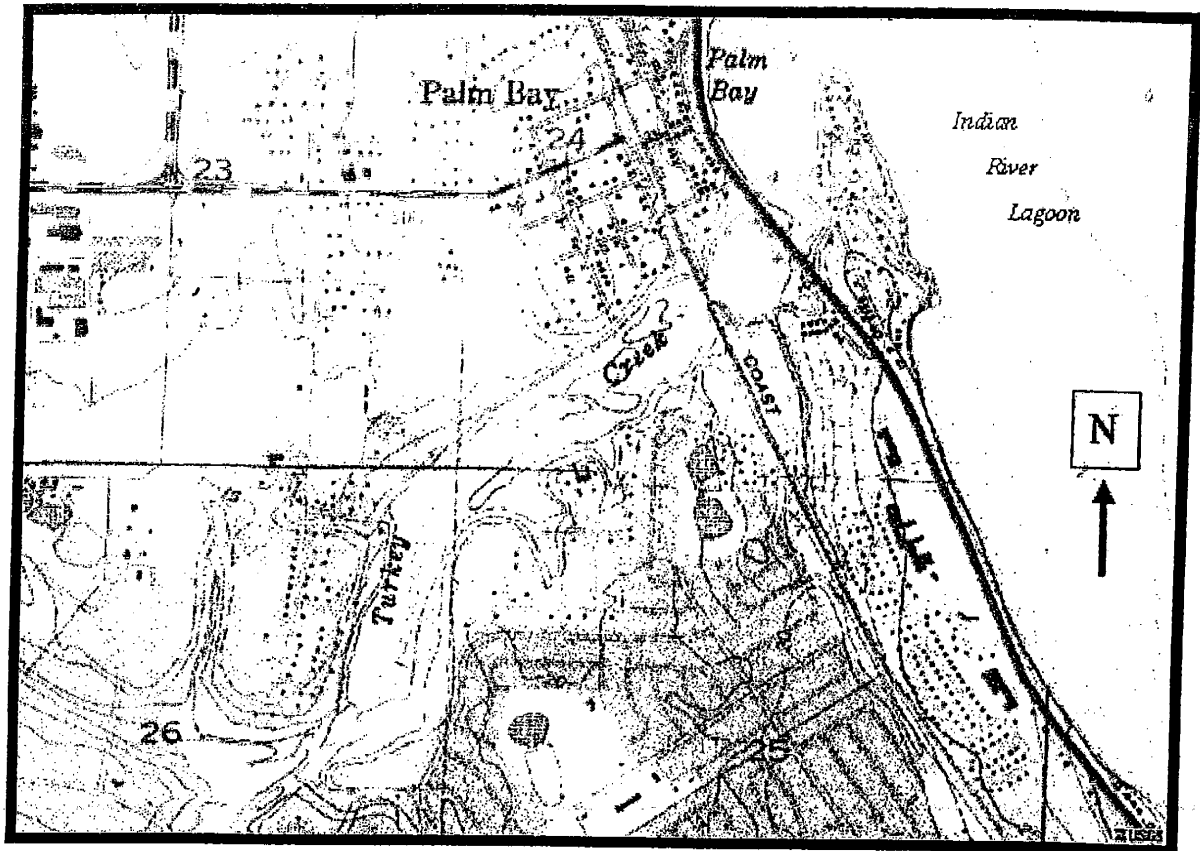


Figure 4: Confluence of Turkey Creek and the IRL.

As with all photosynthetic plants, seagrasses require sunlight to survive. Reductions in light levels may be attributed to dark water color associated with tannins and organic acids, and to turbidity from sediment resuspension and allochthonous material of either organic or mineral nature. Nitrogen and phosphorus are nutrients that certainly can have a negative effect on seagrasses by encouraging the growth of algae and plankton, both of which reduce light levels (Woodward-Clyde, 1994). It's quite evident that freshwater discharges laden have over-enriched Turkey Creek and the lagoon with their suspended matter and nutrient loads. Further, the erosive velocities of the high discharge flows have damaged substantial portions of the embankment along Turkey Creek (See Photo 3), which in turn, adds to the sedimentation that occurs at the mouth of Turkey Creek. As a result, periodic dredging must be conducted to improve navigation and water quality. Dredging was conducted from 1998 through 2001 to remove material that wind and waves often transport from the creek into the IRL where it impacts water quality and seagrasses.

Photo 3 Erosion of the bank along Turkey Creek in the Turkey Creek Sanctuary.



6.2 VEGETATION

6.2.1 Indian River Lagoon and Turkey Creek. Historically, seagrasses flourished and were a source of primary productivity in the IRL. They provided vital habitat for a variety of species both commercially significant, such as seatrout (*Cynoscion spp.*), flounder (*Paralichthys spp.*), and hard clams (*Mercenaria mercenaria*), and endangered species, such as manatees (*Trichechus manatus latirostris*) and green sea turtles (*Chelonia mydas*). However, since the construction of the C-1 Canal, large volumes of fresh water discharges combined with a mixture of pollutants, (particulate matter and nutrients) have resulted in a detrimental effect on the estuarine system of the IRL resulting in an incremental loss of approximately 90 percent of the seagrasses. Seagrasses typically provide food, refuge from predation, and sediment stabilization. Fish, turtles, manatees and other organisms eat the seagrasses. Juvenile fish and other prey species seek refuge in the seagrass from predation. In addition, seagrass beds are stabilized by dense root mats, which in turn help stabilize the sediments. Seagrasses associated with the IRL are discussed below (Woodward-Clyde, 1994).

- **Turtle Grass (*Thalassia testudinum*).** Turtle grass is a member of the Hydrocharitaceae or frogs-bit family. It can be distinguished from other seagrass species in the IRL by the width of its leaves, which are 0.2 to 0.5 inches. Turtle grass is found several miles south of Palm bay, predominately within and south of the Sebastian Inlet area, and in depths less than 3.3 feet in the IRL.

- Shoal Grass (*Halodule wrightii*). Shoal grass is a member of the Cymodoceaceae or manatee grass family. Leaves are similar to those of turtle grass except they are usually less than 0.1 inch in width. Shoal grass is the most predominant species of seagrass and is found throughout the IRL. It is most abundant in water less than 3.3 feet in depth.

- Manatee Grass (*Syringodium filiforme*). Manatee grass is a member of the Cymodoceaceae family and has the only leaves in the IRL that are circular in cross-section. Manatee grass is usually found south of Mosquito Lagoon and is common in the Melbourne/Palm Bay area of the IRL. It is frequently found in association with turtle grass and shoal grass but occurs in greatest abundance in deeper water, between 1.7 and 5.0 feet deep.

- Widgeon Grass (*Ruppia maritima*). Widgeon grass is the only member of the Ruppiaceae family in Florida. It is more tolerant of lower salinities than other seagrasses and is found scattered throughout the IRL. It does not occur frequently south of the IRL.

- Paddle Grass (*Halophila decipiens*). There are three species of seagrass that share the genus *Halophila* and all are members of the Hydrocharitaceae family. Paddle grass is a small, bright green plant, less than 2 inches in height, and is usually found well south of Turkey Creek within and south of the Sebastian Inlet area.

- Star Grass (*Halophila englemanni*). Star grass is a small, perennial species that is well distributed throughout the IRL. It grows in deeper water than most seagrasses and can be found in waters from 1 foot to 6 feet in depth.

- Johnson's Seagrass (*Halophila johnsonii*). Johnson's grass is similar in appearance to paddle grass, but the leaves are shorter and more slender. It is found in deeper water (up to 10 feet) and in shallower water than most other seagrass species. It is believed to be endemic to the area between Biscayne Bay and Sebastian Inlet. Johnson's seagrass is federally listed as a threatened species.

In addition to the seagrasses, other habitats along the IRL include saltmarsh, mangrove swamps, spoil islands, and hammocks. The coastal saltmarsh includes dense stands of smooth cordgrass (*Spartina alterniflora*), saltgrass (*Distichlis spicata*), and black needle rush (*Juncus roemerianus*). In addition to the grass species, two succulent species, glasswort (*Salicornia virginica*) and saltwort (*Batis maritima*) also occur in the saltmarsh habitat. In the IRL, saltmarsh is the predominant emergent species in the northern portion of the IRL providing a home for a variety of reptiles, amphibians, small mammals, birds, invertebrates and crustaceans (EPA/IRL website). Mangrove swamps are the predominant emergent species in the central and southern portions of the IRL. Different species of mangroves include the red mangrove (*Rhizophora mangle*), the black mangrove (*Avicenna germinans*) and the white mangrove (*Laguncularis racemosa*). Mangroves provide a unique community for birds that form rookeries in them during nesting season and for fish that find refuge among the root system from predation. The

such as algae, sponges, sea squirts and barnacles are observed on the submerged roots. Spoil islands have been created in the IRL as a result of dredging to expand the Intracoastal Waterway. The islands are accessible only by boat and, as such, provide a refuge particularly for birds during nesting season. Hammocks are areas of slightly higher elevation than the surrounding wetland areas allowing terrestrial species to grow. Within the IRL region there are oak, palm and other tropical hardwood hammocks. Turkey Creek, as discussed below, is surrounded by hydric hammock.

Turkey Creek is a blackwater creek that meanders to the IRL through the Turkey Creek Sanctuary, a natural preserve. It terminates at the MS-1 gated structure where water discharges from the C-1 Canal into Turkey Creek. The creek is surrounded by hydric hammock, which are described as closed canopy forests of broad-leaved, evergreen trees. Within hydric (wet) hammocks a rich variety of plant species occur, including live oak (*Quercus virginiana*), laurel oak (*Quercus laurifolia*), cabbage palm (*Sabal palmetto*), red bay (*Persea borbonia*), sweet bay (*Magnolia virginiana*), hackberry (*Celtis laevigata*), elm (*Ulmus americana*), red mulberry (*Morus rubra*), and the sub-tropical wild coffee (*Psychotria nervosa*) (Schmalzer, undated). Hammocks provide suitable moist habitat for epiphytes, which along Turkey Creek include bromeliads and resurrection ferns (*Polypodium polypodioides*). Golden polypody (*Phlebodium aureum*) and shoestring fern (*Vittaria lineata*) are found on cabbage palms. Near the mouth of Turkey Creek, there are dominant stands of salt tolerant cattails (*Typha spp.*). Willow (*Salix carolinia*) is abundant along the fresh-brackish water areas. Species identified along the creek at the Turkey Creek Sanctuary in Palm Bay included the invasive Brazilian pepper (*Schinus terebinthifolius*), cattails, cabbage palm and live oaks. Turkey Creek is used recreationally for canoeing and kayaking. Visitors to the Turkey Creek Sanctuary also have access to the creek via trails and a boardwalk.

6.2.2 C-1 Canal. The C-1 Canal extends 10 miles from Turkey Creek in a predominantly urban area in the east and transitions to a rural and predominantly agricultural setting in the west as it approaches the C-1 Retention Area and the SLWMA.

6.2.3 C-1 Retention Area. Vegetative community classifications have been provided by Kim Ponzio of the St. Johns River Water Management District.

The C-1 Canal will discharge into the 1,280 acre C-1 Retention Area where elevations currently range from 17 ft. NBVD in the northern portion to 13 ft. NGVD in the southern portion. The southern end of this area is dominated by a dense cover of sawgrass (*Cladium jamaicense*) (See Photo 4). Cattail, ferns and other herbaceous species and small shrubs may also be present. Sawgrass grows in dense, uniform stands that can cover large areas. Coarse textured, with sharp-toothed leaf blades can make encounters with this plant hazardous. Utilized for food and shelter by many wildlife species, sawgrass provides cover and food for migrating waterfowl, which forage on the seeds as a high-energy source. Sawgrass is also used for cover by reptiles and amphibians and provides nesting sites for many species of birds other than waterfowl (DNR 1986). The northwestern edge of the sawgrass marsh is intermingled

with wetland grasses or sedge species including maiden cane (*Panicum hemitomon*), cupscale (*Sacciolepis striata*), and spikerush (*Eleocharis spp.* *Rhynchospora spp.*). The sawgrass marsh transitions to the north into mixed herbaceous marsh, transitional shrub and cabbage palm hammocks with pasture occurring in hydric or mesic conditions. The mixed herbaceous marsh is described as mostly broadleaved emergent or semi-floating species such as *Sagittaria*, *Pontederia*, *Hydrocotyle*, and *Polygonum* interspersed with grasses, sedges, cattail and/or sawgrass. The transitional shrub areas are identified by the presence of wax myrtle (*Myrica sp.*) and saltbush (*Baccharis sp.*). The northern end of the C-1 Retention Area is comprised predominantly of pastureland, canals and borrow pits. The pastureland is identified by the presence of introduced or cultivated grass species and includes areas that are now abandoned. Drainage ditches, fence lines, and water troughs are also present in the pasture areas.

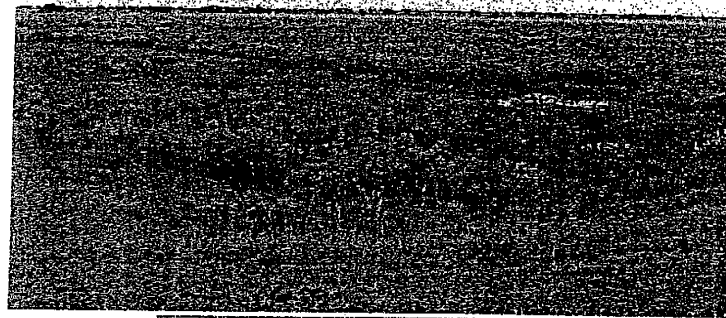


Photo 4: C-1 Retention Area

Numeric modeling by the SJRWMD indicates that following a 5-year storm event, the retention area would require approximately 48 days for peak water levels (elevation 18' NGVD) to return to pre-storm conditions (elevation 13' NGVD). It is also anticipated that there would be approximately two (2) feet of standing water within the retention area for approximately 20 days. This would occur for a single storm event. Long term simulation results indicate that water levels in the C-1 Retention Area will remain between elevation 13 ft. NGVD and 15 ft. NGVD, on average, for approximately 121 days out of the year.

6.2.4 Sawgrass Lakes Water Management Area. The 2,240-acre SLWMA has been primarily used for cattle grazing (see Photos 5 & 6). With the exception of the southeast corner of this area, the predominant vegetative cover of the southern half of the SLWMA is grass/sedge marsh with large expanses of *Spartina* marsh interspersed with cabbage palm hammocks, and

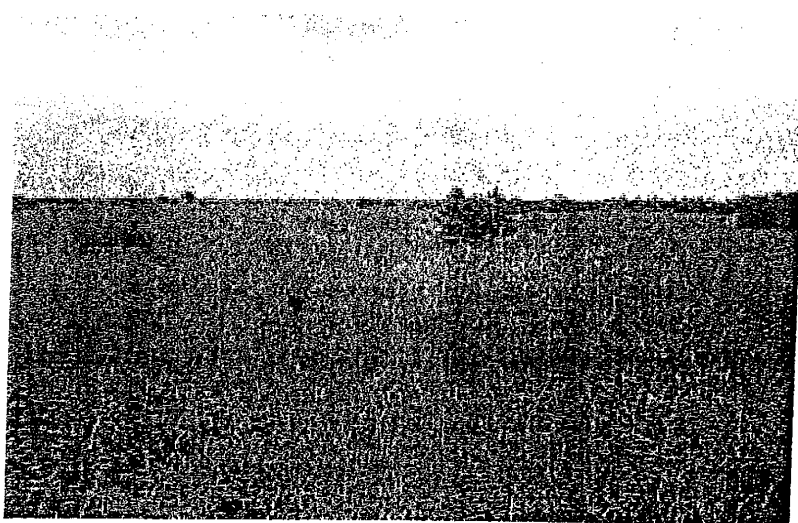
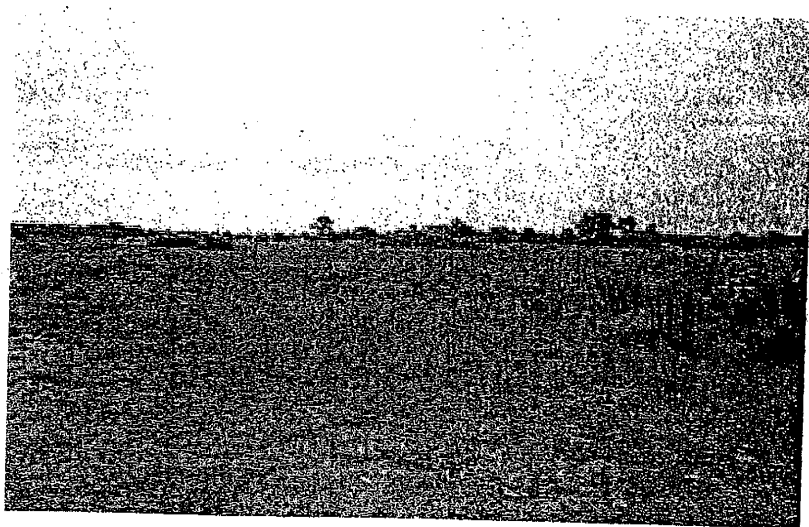


Photo 5: Sawgrass Lakes Water Management Area

mixed herbaceous marsh. The *Spartina* marsh consists of predominantly sand cordgrass (*Spartina bakerii*) with soft rush (*Juncus effuses*) and other shallow water plants as minor components. The southeast corner of the SLWMA is primarily in a transitional shrub cover interspersed with patches of pasture, mixed herbaceous marsh, grass/sedge marsh and cabbage palm hammocks. The northern half of the SLWMA is predominantly pastureland, part of which has been abandoned. This pastureland is interspersed with mixed herbaceous marsh and includes areas of grass/sedge marsh, transitional shrub and cabbage palm hammocks in the southwestern corner. The northwestern corner includes transitional shrub and oak hammock vegetative cover, which consists of greater than 70% live oak coverage.

Photo 6: Sawgrass Lakes Water Management Area



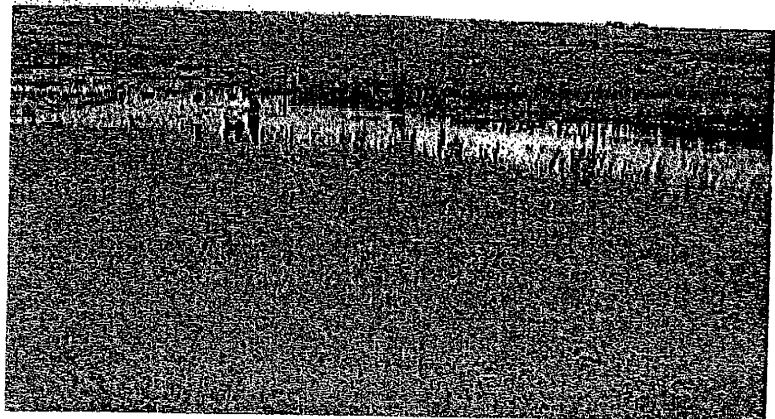
The establishment and management of this area as a wetland will require maintaining 18 inches to 2 feet of water in the cells (H. Herrera, verbal communication, 6/6/01). During dry periods, water will be recirculated between the C-1 Retention Area and the SLWMA. This will be accomplished by opening a low flow culvert that is located at the southwestern corner of the SLWMA in the west end of the C-1 North Levee. This culvert allows water to flow from the exiting C-2 Canal along the western boundary of the SLWMA and discharge into the C-1 canal. The C-1 pumps will then pick the water up and discharge into the SLWMA cells. Recirculation rates will vary from 45 cfs to 10 cfs (H. Herrera, personal communication, 10/3/01).

6.2.5 St. Johns Marsh Conservation Area. The SJMCA consists of approximately 26,000 acres of freshwater marsh, pasture, forested wetlands, and shallow lakes lying between the Levee 74W and US 192 (See Photos 7 & 8).



Photo 7: Saint Johns Marsh
Conservation Area

Photo 8: Saint Johns Marsh
Conservation Area



The northern portion of the SJMCA which pertains to this project, is bordered to the east by the SLWMA and the C-1 Retention Area. Consequently, vegetative cover offers some similarities. Cover on the SJMCA includes *Spartina* marsh interspersed with sawgrass, saltbush, wax myrtle, and cabbage palm hammocks. Man-made canals running parallel with Levee 74W are vegetated with herbaceous marsh plants such as pickerelweed (*Pontederia*), arrowhead (*Pontederia*) and *Eleocharis*. Hammocks of palm trees, oaks, saw palmettos and shrubs are scattered throughout the area. These hammocks provide shelter for deer, mammals such as fox and raccoon, and numerous reptiles.

6.3 FISH AND WILDLIFE RESOURCES

Much of the information presented in this subsection was compiled by the SJRWMD, included in the Upper Saint Johns River Basin and Related Areas; Supplement 2, General Design Memorandum (GDM), Upper St. Johns River Basin Addendum III with Draft Environmental Impact Statement (DEIS), found in the Biological Resources of the Indian River Lagoon, Indian River Lagoon National Estuary Program Melbourne, Florida as compiled by Woodward-Clyde Consultants, in the Environmental Impact Statement on Proposed Modifications to Project Features North of the Fellsmere Grade, Central and Southern Florida Flood Control Project, Upper St. Johns River Basin and Related Areas, Brevard County, Florida (EIS) and on the EPA IRL web site.

6.3.1 Invertebrates. Two fresh water invertebrates found within the Upper Saint Johns River Basin (USJRB) and within the project area, which are important prey items for wading birds, fish, and mammals, are crayfish (*Procambarus allenii*) and fresh water shrimp (*Palaemonetes paludosus*). Another very important invertebrate, the apple snail (*Pomacea paludosa*) is found throughout the wetlands. This species is the exclusive prey for the Federally endangered snail kite (*Rostrhamus sociabilis plumerus*).

Growing to approximately 2.8 inches, the apple snail is the largest freshwater snail in North America, occurring in warm waters of rivers, lakes, and ponds. Indigenous to Cuba and Florida, this species is capable of surviving periods of drought by burying itself in mud. *P. paludosa* is reported to prefer broad stemmed plants for laying eggs and is abundant in sawgrass marshes. This snail has particular importance as a major prey species, not only for the snail kite, but also for the white ibis, *Eudocimus albus*, the limpkin, *Aramus guarana*, and the boat-tailed grackle, *Casidix mexicanus* (University of Mississippi, College of Marine Science website). Research conducted by Darby et. al. of the Florida Cooperative Fish & Wildlife Research Unit, 1997 indicated that the apple snail is found in sawgrass, prairie, slough and cattail habitats which occur in the C-1 Retention Area and the SLWMA. Snails were found in higher numbers in the prairie or cattail habitats, while eggs were laid in higher densities in densely vegetated areas such as sawgrass and cattail habitats. Wetland areas that undergo periodic dry

turn may contribute to snail kite population declines. Particularly, dry down periods should be timed to avoid the egg laying period, which occurs between March and July.

The IRL and Turkey Creek also provide productive habitat for benthic invertebrates. Among the several hundred species known to occur within the IRL system, polychaete (segmented) worms, crustacea such as amphipods, isopods, crabs, and *Penaeus* shrimp, and mollusks such as snails and clams dominate both the epifauna and infaunal communities over vegetated as well as unvegetated substrate (Woodward Clyde, 1994). Benthic organisms play an important role in the IRL system, serving as prey for higher animals, providing commercially valuable resources, and converting plant and detrital material into forms available to higher-level consumers. Commercially important shellfish include the hard clams (*M. mercenaria* and *M. campechiensis*), American oyster (*Crassostrea virginica*), and blue crab (*Callinectes sapidus*), all of which are susceptible to changes in water quality, salinity and/or sedimentation.

Of particular interest are clam harvests, which in the mid-1980s peaked at approximately 1.3 million pounds. Following the mid-1980s, a decline in the clam harvests occurred. This is reported to be due to declines in water quality, large drops in salinity due to high storm water discharge events and possibly over-harvesting following the mid-1980 period (Woodward-Clyde, 1994). Juvenile clams have exhibited sensitivity to salinities of less than 20 ppt. Much of the clam industry is located in Brevard County where impacts to low salinities are most prevalent.

6.3.2 Fisheries Resources. Within the USJRB, there is a thriving freshwater sport fishery resource, which includes the largemouth bass (*Micropterus salmoides*), black crappie (*Pomoxi nigromaculatus*) and bluegill (*Lepomis machrochirus*). Numerous forage fish such as the mosquitofish (*Gambusia affinis*), bluefin killifish (*Lucania goodei*), and least killifish (*Heterandria formosa*) are also abundant. The EIS provides a complete list of fish that may be found in the basin. This resource provides an important recreational benefit as well as an important food base for wading birds and raptors.

In addition, the IRL provides an important recreational and commercial fishery, as well. Important commercial species include the bay anchovy (*Anchoa mitchilli*), tidewater silversides (*Menidia peninsulae*), rainwater killifish (*Lucania parva*), striped and silver mullet (*Mugil cephalus* and *M. Curema*), pinfish (*Lagodon rhomboids*), and menhaden (*Brevoortia spp.*). Important recreational and/or sport fishes, which are found in the IRL, include the spotted seatrout (*Cynoscion nebulosus*), red drum (*Sciaenops ocellatus*), common snook (*Centropomus undecimalis*), and flounder (*Paralichthys sp.*).

Ranging from Maine to the Yucatan Peninsula, the bay anchovy is one of the most abundant fishes in estuaries along the U.S. Atlantic and Gulf coasts (Woodward-Clyde, 1994). An abundant fish in the IRL system, it is reported that bay anchovies spawn throughout the IRL from early spring through late autumn. The bay anchovy is an important feeder on zooplankton and is also a forage fish for many predators. As such, it

plays a vital role in the food web as a link between primary consumers and higher trophic levels.

The striped mullet is significant to the IRL ecosystem as a primary consumer and forage fish. As such, it is an economically important species for commercial and recreational fishing. An herbivorous scavenger, it is highly dependent on estuaries and is found throughout the IRL system with the exception of the lagoon reef areas (EPA IRL website). While adults may be found in a broad range of salinities and fresh water, it is reported that the young cannot survive a sudden change from brackish water to freshwater (Woodward-Clyde, 1994). This may be significant considering the percent of freshwater that presently discharges from C-1 Canal via Turkey Creek.

Pinfish are found in marine and estuarine waters off the coast of North America from Cape Cod, Massachusetts to the Yucatan Peninsula, and it is one of the most common fishes found in seagrass beds of the IRL system. The presence/absence of vegetation appears to be the predominant factor affecting habitat choice. Because pinfish are relatively abundant and found throughout the system, they are used as a forage fish by predator species such as snook, snapper, and seatrout.

Spotted seatrout occur throughout the IRL and play a vital role in the ecology of the system as an important predator species, feeding on fish and shrimp (EPA IRL website). An estuarine resident, the seatrout spends the vast majority of its life, in the IRL. Stable temperatures and the presence of submersed vegetation (seagrass beds) are considered two vital factors for determining habitat suitability for the seatrout (Woodward-Clyde, 1994).

Red drum is an important sport fish and predator around the entire Florida coast and is frequently found in many areas of the IRL feeding on crustaceans, fish and mollusks (EPA IRL website). Juveniles are attracted to seagrass beds and over open muddy bottoms. Salinities < 25 ppt are considered detrimental since eggs sink at these salinities (Woodward-Clyde, 1994). This may be significant considering the percent of freshwater that discharges via Turkey Creek during storm water events.

Snook are prized game fish and are significant predators in the IRL consuming a wide variety of forage fish and crustaceans. Until the population decline in recent years, snook were also an important commercial species. Found throughout the IRL, snook exhibit a strong affinity for vegetation or other forms of submerged or emergent structures.

6.3.3 Reptiles and Amphibians. There are 71 species of reptiles and amphibians identified within and adjacent to the IRL. A complete list is found in the Woodward-Clyde document, Volume 2. Common reptiles found within the project area include the American alligator (*Alligator mississippiensis*), cooter (*Chrysemys floridana*), Florida softshell turtle (*Trionyx ferox*), mud turtle (*Kinosternon bauri*), and snapping turtle (*Chelydra serpentina*). Within the drier habitats, several species of snakes are found such as the southern ringneck snake (*Diadophis amabilis*), southern black racer

(*Coluber constrictor*), eastern diamondback rattlesnake (*Crotalus adamanteus*), pygmy rattlesnake (*Sistrurus barbouri*), and the eastern indigo snake (*Drymarchon corais*), a Federally threatened species. The wetter habitats support more aquatic species such as water snake (*Natrix sipedon*), Everglades's rat snake (*Elaphe obsoleta*), green water snake (*Natrix sipedon*), and cottonmouth (*Agkistrodon piscivorus*). The pig frog (*Rana grylio*) is one of the most important amphibians to occur within the project area for its recreational and commercial aspects. Other important frog species include the Florida cricket frog (*Acris gryllus*) and the southern leopard frog (*Rana sphenoccephala*).

In addition, several species of turtles are found, including sea turtles, the gopher tortoise (*Gopherus polyphemus*), and the diamond-backed terrapin (*Malaclemys terrapin*). Sea turtle species that have been observed in the IRL include the Atlantic loggerhead (*Caretta caretta*), the Atlantic green turtle (*Chelonia mydas*), the Atlantic ridley (*Lepidochelys kempii*), the Atlantic leatherback (*Dermochelys coriacea*), and the Atlantic hawksbill (*Eretmochelys imbricata*). Only the loggerhead and the green are prevalent species playing an important role in the ecology of the IRL. The other three species are rarely seen in the IRL.

The gopher tortoise is an upland species that creates burrows which are shared with a variety of invertebrates, snakes, rodents, skunks, and other turtles. Because of this, it is considered a species critical to the survival of other species within the community.

The diamondback terrapin is found within the saltwater habitat of the IRL. Its continued survival depends on maintaining the health of the habitat in which it lives.

The Atlantic loggerhead sea turtle, a federally listed threatened species, is found in the IRL region and the adjacent Atlantic shoreline. Further, female loggerheads utilize the Atlantic beaches of the IRL region for nesting purposes from May to July of each year. Identified by their massive heads, these turtles may reach 400 pounds and be 2 – 4 feet in length. Omnivorous, adult loggerheads forage on mollusks, shrimp and other crustaceans, in addition to turtle grass and algae. Juveniles feed primarily on crabs and mollusks.

The Atlantic green sea turtle, a Federally endangered species is herbivorous and may grow to be slightly longer than the loggerhead, weighing 220-389 pounds and reaching lengths of 35 to 46 inches. The adult greens primarily eat seagrasses, especially turtle grass, but they will prey on crabs, jellyfish and other marine invertebrates. Juveniles have been observed living in the lagoon until they reach sexual maturity at about seven years. Juveniles feed predominantly on small invertebrates. The papilloma virus that causes tumorous growths on sea turtles and appears to predominantly affect the green sea turtle has been identified on turtles in the IRL. Since there is no recorded historical record of these growths on sea turtles in the IRL, this appears to be a recent occurrence. It is speculated that the occurrence of this virus is the result of water quality degradation and continuing studies are on-going. The green turtle is federally listed as an endangered species.

The Atlantic ridley turtle is the most endangered of the marine species that are Federally listed. It is estimated that the population of Atlantic ridleys is less than 600 today. A transient species, this turtle has been rarely observed in the IRL.

The Atlantic leatherback is the largest of the sea turtle species, weighing over 1,300 pounds. This species feeds predominantly on jellyfish and they have been observed to eat their weight in jellyfish in a single day during peak feeding seasons. Use of the IRL by the leatherback appears to be low. The leatherback is federally listed as an endangered species.

One of smaller species of sea turtles is the Atlantic Hawksbill, with mature females only weighing approximately 100 pounds. As with the Atlantic ridley, this turtle is considered a highly endangered, Federally listed species due to the use of the shell for jewelry and the use of meat and eggs for food. These turtles have been observed in the IRL, but they are not a prevalent species.

6.3.4 Avifauna. Shallow waters within the project area are used predominantly by various wading birds, including the Federally endangered wood stork (*Mycteria americana*), and waterfowl primarily for feeding, nesting, loafing and some roosting. Wading bird species that have been identified in the USJRB include cattle egret (*Bulbulcus ibis*), great egret (*Casmerodius albus*), great blue heron (*Ardea herodias*), little blue heron (*Egretta caerulea*), snowy egret (*Egretta thula*), tricolored heron (*Egretta tricolor*), glossy ibis (*Plegadis falcinellus*), white ibis (*Eudocimus albus*), and wood stork.

Hoffman (1996) and Sewell (1999 and 2001) reported that from 1993, wading bird nesting increased in the upper basin. It also appears that the species composition is changing. Cattle egrets had once comprised a significant proportion (over 50 percent) of birds nesting in the marsh. However, this proportion has decreased since 1993. The proportion of wood storks nesting has increased since 1993.

Hoffman reported that a majority of the birds breeding in the USJRB are foraging elsewhere. More wood storks were observed feeding in agricultural lands that included drainage ditches rather than marshes. Cattle egrets, while nesting in large numbers in the marshes are feeding throughout the region. Research by Sewell was consistent with that of Hoffman in that greater numbers of wading birds were identified in the southern reaches of the USJRB than in the northern reaches.

The snail kite is federally endangered throughout its range primarily by habitat destruction (U.S. Fish & Wildlife Service website). As noted above, the kite feeds almost exclusively on the apple snail, which requires sufficient water depths and vegetation for breeding and survival. The kite inhabits open freshwater marshes and is observed in sloughs and flats that are vegetated by sawgrass and spikerushes. The areas must retain a stable enough water table to support the apple snail population. Further, since snail kites forage by sight, areas covered with floating aquatic vegetation, such as water hyacinth,

cannot be used. Further information regarding this species is offered in Section 7.0 of this report.

The osprey (*Pandion haliaetus*) and bald eagle (*Haliaeetus leucocephalus*), brown pelican (*Pelecanus occidentalis*), double-crested cormorant (*Phalacrocorax auritus*), and other waterfowl feed predominantly on fish within the deeper open waters of the IRL. The osprey, bald eagle and brown pelican all have keen eyesight allowing them to see fish beneath the surface of the water. Typically, they follow an "air to water" diving pattern for catching prey. The double-crested cormorant, in contrast, will actually dive underwater from the water surface using its feet for propulsion in order to catch prey. Each of these species and a variety of other wading birds discussed above, in addition to waterfowl, use the IRL for foraging habitat.

6.3.5 Mammals. Several larger mammals such as deer, feral hogs, bobcat, and fox and many of the smaller fur-bearing mammals such as raccoon, opossum, armadillo, muskrat, and weasel feed in the marsh and wet prairie habitats. According to the Florida Natural Areas Inventory (2001), rare mammalian species found within the SJRWMD in Brevard County include Rafinesque's big-eared bat (*Corynorhinus rafinesquii*), the Florida long-tailed weasel (*Mustela frenata peninsulae*), the round-tailed muskrat (*Neofiber alleni*), and the Florida manatee (*Trichechus manatus latirostris*). Of these, the weasel and muskrat have the potential for being present throughout much of the project area.

6.3.5.1 Indian River Lagoon. Rafinesque's big-eared bat and the Florida manatee would potentially be more prevalent in the IRL/Turkey Creek area. Smaller fur-bearing mammals such as raccoon, opossum, armadillo, muskrat, and weasel may be found in the marsh habitat. Additional species that would typically be found within the hydric hammock of Turkey creek include the Florida golden mouse (*Ochrotomys nuttalli floridanus*), and the short-tailed shrew (*Blarina carolinensis peninsulae*). Of particular interest with respect to the proposed project is the Florida manatee, for which additional information is included in Section 7.0 of this document.

6.3.5.2 Upper St. Johns River Basin. Larger mammals such as deer, feral hogs, bobcat, and fox and many of the smaller fur-bearing mammals such as raccoon, opossum, armadillo, muskrat, and weasel feed in the wet prairie habitats. Other non-rare, endemic species known to occur in wet prairie habitat include the rice rat (*Oryzomys palustris colorata* and *natator*) and the hispid cotton rat (*Sigmodon hispidus floridanus*). Otters occur in the St. Johns River (EIS).

7.0 THREATENED AND ENDANGERED SPECIES

The Service has evaluated the proposed Section 206 C-1 Rediversion Canal Ecosystem Restoration Project in Brevard County for potential adverse impacts to federally listed species, or destruction or adverse modification of critical habitat.

Audubon's crested caracara	<i>Polyborus plancus audubonii</i>	T
Carter's Mustard	<i>Warea carteri</i>	E
Crane, Whooping	<i>Grus americana</i>	E
Eagle, Bald	<i>Haliaeetus leucocephalus</i>	T
Kite, Snail	<i>Rosthrhamus sociabilis plumbeus</i>	E
Manatee, Florida	<i>Trichechus manatus latirostris</i>	E/CH
Mouse, Southeastern Beach	<i>Peromyscus polionotus niveiventris</i>	T
Plover, Piping	<i>Charadrius melodus</i>	T
Scrub-jay, Florida	<i>Aphelocoma coerulescens</i>	T
Snake, Atlantic Salt Marsh	<i>Nerodia clarkii (=fasciata) taeniata</i>	T
Snake, Eastern Indigo	<i>Drymarchon corais couperi</i>	T
Stork, Wood	<i>Mycteria americana</i>	E
Turtle, Green Sea	<i>Chelonia mydas</i>	E
Turtle, Hawksbill Sea	<i>Eretmochelys imbricata</i>	E
Turtle, Leatherback Sea	<i>Dermochelys coriacea</i>	E
Turtle, Loggerhead Sea	<i>Caretta caretta</i>	T
Woodpecker, Red-cockaded	<i>Picoides borealis</i>	E

The above table lists the federally threatened and endangered plants and animals that occur or potentially occur in Brevard County. Of that group, the Florida manatee (*Trichechus manatus latirostris*), and green sea turtle (*Chelonia mydas*) may occur in the IRL region of this project. The wood stork (*Mycteria americana*), Audobon's crested caracara (*Polyborus plancus audubonii*), snail kite (*Rosthrhamus sociabilis plumbeus*), and whooping crane (*Grus americana*), would be predominantly found in the USJRB. The Eastern indigo snake (*Drymarchon corais couperi*) and bald eagle (*Haliaeetus leucocephalus*), may potentially be found around the Turkey Creek/IRL area and also within the USJRB.

7.1 FLORIDA MANATEE. The Florida manatee (*Trichechus manatus latirostris*) is a subspecies of the West Indian manatee (*Trichechus manatus*) and found predominantly in Florida and Georgia. The West Indian manatee was listed as endangered in March 1967/ June 1970, and critical habitat has been designated for this species. In addition, Turkey Creek entire is considered a manatee protection area. Critical habitat is defined in the Act, Section 3(5)(A)(i), as the "specific areas within the geographical area occupied by the species, at the time it is listed in accordance with section 4 of the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection". One of the most endangered marine mammals in the coastal United States, the major threats to Florida manatees are 1) collisions with watercraft which account for 25 percent of annual mortality and 2) destruction and degradation of habitat. A record 3,276 manatees were counted in the winter period of January 2001, [USFWS], personal comm., 2001).

Manatees inhabit both salt and fresh water that is 5 feet to approximately 20 feet deep. They generally use the same summer and winter habitat each year and prefer shallow grass beds with access to deep channels for feeding areas. Manatees are primarily herbivores that feed on a wide variety of submerged, floating and emergent vegetation

Breeding occurs in mating herds where females mate with a number of males during a 2 to 4 week period. Permanent bonds between males and females do not form. The only long-term relationships are between the cow and her calf, lasting between 1 and 2 years. Calving intervals are usually between 2 to 2.5 years, but may be longer.

As proposed, it is anticipated that this project will reduce freshwater flows and associated sedimentation into the IRL allowing for maintenance of optimum salinities. This will, in turn, encourage regrowth of the seagrasses on which the manatee feed. Without the project, the freshwater flows will continue to detrimentally impact re-growth of seagrasses, which impacts not only the foraging habitat of the manatee but also the foraging and refuge habitat of a variety of fish species. Ultimately, if the project is not completed, the freshwater flows and sedimentation will continue to degrade the IRL ecosystem.

7.2 BALD EAGLE. The bald eagle was down listed to threatened status in July 1995. No critical habitat has been designated for this species. In Florida, there are approximately 1,000 active bald eagle nesting territories. Figure 5 shows the approximate location of bald eagle nests in the southern half of Brevard County.

Bald eagles generally nest near large rivers, lakes or estuaries where they feed primarily on fish and water-dependent birds. Bald eagles are considered a water-dependent species (Herrick 1924, Stevenson and Anderson 1994). Nesting habitat includes the nest tree, usually a live pine (*Pinus* spp.) or bald cypress (*Taxodium* spp.), and perch and roost sites. Eagles will, however, nest in dead trees, and recently have been observed nesting on towers. In Florida, most nests are found within five miles of water (McEwan and Hirth 1979, Wood et al. 1989). In areas with a high human population, the distance between the nest site and water may be greater.

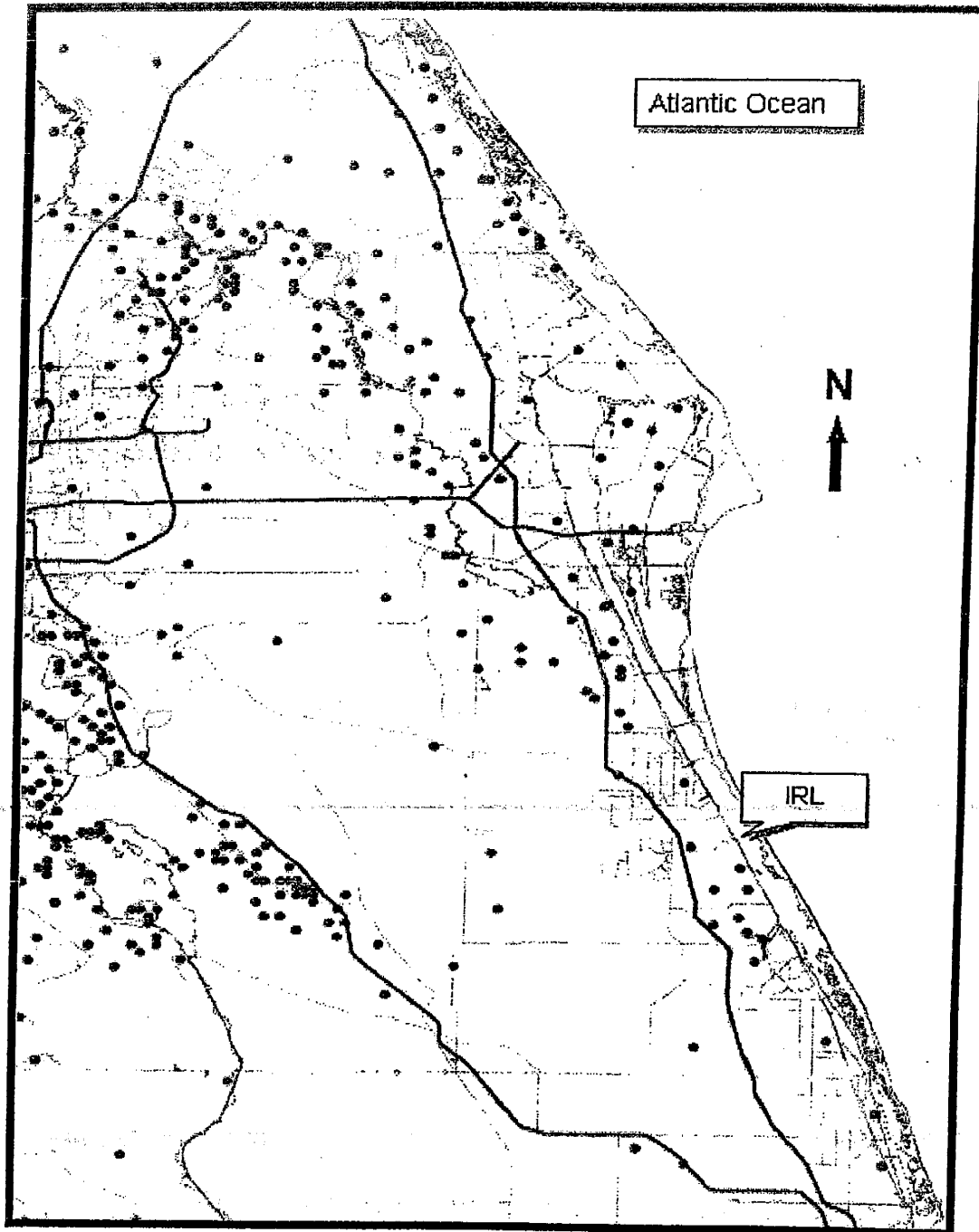
Eagles are monogamous, and usually initiate nesting in the beginning of October. Incubation is about 30 days and the young fledge in about 90 days, usually by mid-May.

Eagles are opportunistic feeders. They will select live prey as well as feed on carrion. The primary diet is fish, but will take small to medium size mammals (Johnsgard 1990).

Because of the eagles improved population status and the availability of existing habitat under present conditions, neither maintaining the existing conditions nor constructing the proposed project is expected to provide measurable benefits or detriments to the eagle population in southern Brevard County.

7.3 AUDUBON'S CRESTED CARACARA. The Audubon's crested caracara was listed as threatened in July 1987. No critical habitat has been designated for this species. This species is a large, boldly patterned raptor, with a crest and unusually long legs. It is a Florida resident, diurnal, long-lived, and non-migratory.

Figure 5. Bald Eagle Nests in Southern Brevard County.



Currently, the greatest concentration is within a five-county area north and west of Lake Okeechobee, including Glades, DeSoto, Highlands, Okeechobee, and Osceola. Birds are observed elsewhere, however. There is only one known active nest in Brevard County, at Viera. This species occurs in dry or wet prairie areas with scattered cabbage palm (*Sabal palmetto*). It may also be found in lightly wooded areas. This species also uses improved or semi-improved pastures, again with scattered cabbage palm (Layne 1996). The nest at Viera is in improved pasture, in a cluster of cabbage palms.

Little is known regarding breeding behavior. Egg laying begins in early December and the height of the nesting season is January and February (Nicholson 1929). Nests are well concealed, and are found in tops of cabbage palms (J.Morrison, University of Florida, pers.com). Nests have also been found in live oaks (*Quercus virginiana*), Australian pine (*Casuarina spp.*), and black gum (*Nyssa biflora*). Clutch size is two or three eggs. Incubation lasts for about 28 days and is shared by both sexes. The young fledge in about eight weeks (Bent 1961).

This species is highly opportunistic in their feeding habits, eating carrion and capturing live prey. Their diets include insects and other invertebrates, fish, snakes, turtles, birds and mammals. They hunt on the wing, from perches and on the ground (Layne 1978). They have been observed feeding on road kills in the company of vultures (Palmer 1988).

In light of the above, if the project is not constructed, no significant change in the caracara population in the project vicinity is anticipated. Construction of the proposed project may provide additional foraging area, which will be beneficial to the species.

7.4 WOOD STORK. The wood stork was listed as endangered in February 1984. No critical habitat has been designated for this species. The wood stork is a large, long-legged wading bird. Currently, wood storks breed in north and south Florida, parts of Georgia and coastal South Carolina. Wood storks have been documented nesting in the USJRB, in close proximity to the SJMCA. Aerial surveys conducted between 1993 and 1995 documented up to 1,300 wood storks and 296 nests in the USJRB (Hoffman 1996). Wood storks were observed foraging in a pasture near the project area. This species is primarily associated with freshwater habitats for nesting, roosting, foraging, and rearing young.

They typically construct their nests in medium to tall trees that occur in stands located either in swamps or on islands surrounded by relatively broad expanses of open water (Palmer 1962), Rogers et al. 1987, Ogden 1991). They tend to use the same colony sites over many years, as long as the sites remain undisturbed and sufficient feeding habitat remains in the surrounding wetlands.

Wood storks are seasonally monogamous, probably forming a new pair bond every season. Females lay a single clutch per breeding season, but will reneest if the nest fails early in the breeding season. They lay about three to five eggs, incubation takes about 30

During the non-breeding season, wood storks are found throughout Florida, with interchange between north and south Florida and between states. This information suggests the notion of a single population in the southeast, which responds to changing environmental conditions through temporal relocation.

Foraging behavior requires that a large concentration of fish be present. Their feeding behavior is referred to as tactolocation or grope feeding. To forage, a wood stork wades through the water with its beak immersed and partially open. When it touches a prey item, the mandibles shut, raises its head, and swallows what it has caught (Kahl 1964). In order to increase feeding efficiency, it is critical that large numbers of fish, their primary prey item, are concentrated in shallow ponds or wetlands. This becomes even more critical during the breeding season when young must be fed. It is important to have sufficient feeding sites in close proximity to the rookeries to provide enough food items to the young in a timely manner to reduce the probability of nestling mortality due to starvation.

Construction of the proposed project will benefit the wood stork more than any other threatened or endangered species discussed in this report. Maintaining the SLWMA as a wetland area will provide additional foraging habitat for the species, which is imperative during breeding season.

7.5 SNAIL KITE. The snail kite was listed as endangered in March 1967, followed by critical habitat designation in August 1977. However, the project area is not within critical habitat. The snail kite is a medium-sized raptor. The slender, decurved bill is an adaptation for extracting the kite's primary prey, the apple snail. The snail kite occurs in Florida, Cuba and Honduras. Within Florida, the current distribution is south and central Florida. Within the USJRB, snail kites are found primarily in the Blue Cypress Water Management Area, south of the Fellsmere Grade. Up to 100 birds and 60 nests have been documented (Miller et al. 1996). Snail kites have been observed in the SJMCA, presumably using the area for foraging purposes.

Snail kite habitat consists of freshwater marshes and shallow vegetated edges of lakes where apple snails can be found. Suitable foraging habitat is typically a combination of a low profile marsh with a mosaic distribution of shallow open water (about 1-foot to 4 feet deep), which is relatively clear and calm in order to visually search for apple snails. The marsh vegetation is dominated by spike rush, maidencane, sawgrass, and/or cattails. Dense growth of herbaceous or woody vegetation is not conducive for efficient foraging.

The snail kite usually nests in loose colonies. The clutch size ranges from one to four eggs. Incubation is between 23 to 30 days, and is shared by both sexes (Sykes 1987, Beissinger 1988). Hatching success is about 2.3 chicks per nest. The most successful hatching period is from February through April (Sykes 1987). Breeding season varies depending on rainfall and water levels. The snail kite, when not breeding, uses communal roosts throughout the year in association with other birds, such as herons.

Without the project, no changes in the use of the project area by the snail kite are expected. If the proposed project is constructed, the snail kite may use the SLWMA for foraging purposes, which would be beneficial to the species.

7.6 EASTERN INDIGO SNAKE. The eastern indigo snake was listed as a threatened species in January 1978. No critical habitat has been designated for this species. The eastern indigo snake is a large, black, non-venomous snake. Throughout most of its range, this species is found in a variety of habitats from pine and scrubby flatwoods, high pine, dry prairie, edges of freshwater marshes, agricultural fields, coastal dunes and human altered habitats. This species requires a mosaic of habitats (Landers and Speake 1980, Auffenberg and Franz 1982). This species requires sheltered "retreats" from winter cold and desiccating conditions, for example, gopher tortoise burrows. Throughout peninsular Florida, the eastern indigo snake may be found in all terrestrial habitats. Eastern indigo snakes have been observed in drier habitats in the project area or along the levees in the Three Forks Marsh Conservation Area and SJMCA.

This species is an active terrestrial and fossorial predator that will eat any vertebrate that it can consume. Adults prey on fish, frogs, toads, snakes, lizards, turtles, turtle eggs, birds and small mammals (Keegan 1944, Babis 1949, Kochman 1978, Steiner et al. 1983). Juvenile indigo snakes eat mostly invertebrates.

Eastern indigo snakes travel over a wide range into various habitats (Smith 1987, Moler 1985, Speake 1993). Adult male snakes have larger home ranges than adult females and juveniles; their ranges may encompass as much as 530 and 390 acres, respectively, in the summer months (Moler 1985, Speake 1993).

Without the project, use of the project area by the eastern indigo snake is not expected to change. If the proposed project is constructed, use of the SLWMA will likely be lessened. As a terrestrial species, it will utilize the edges of the management area, but would not likely use the area when managed as a wetland. It will be forced to relocate to areas with drier conditions.

7.7 WHOOPING CRANE. The whooping crane was listed as a non-essential experimental population in Florida in January 1993. Measuring four to five feet tall, this is the tallest bird in North America. Whooping cranes are snowy white, with black wing tips, feet and beak. Their cheeks and crown are bright red. Juveniles are white with a mottled caramel head and neck. Adults attain a wingspan of up to seven feet.

Whooping cranes are monogamous and normally pair for life. Sexually mature between four and six years of age, the cranes usually lay two eggs, two days apart, in late April or early May. The incubation period is between 29 and 34 days, with fledging between 78 and 90 days. The life span of the whooping crane is 22 to 24 years.

Preferred habitat for nesting includes lake margins or among rushes and sedges in marshes and meadows where water is from eight to 18 inches deep. Emergent vegetation

such as bulrushes and cattails provide protection from disturbance by humans and terrestrial predators.

Whooping cranes are omnivorous feeders taking crabs, clams, shrimp, snails, frogs, snakes, grasshoppers, larval and nymph forms of flies, beetles, water bugs, birds and small mammals. In addition, they eat over 58 species of fish.

It is anticipated that the proposed project will provide additional foraging and nesting habitat for the whooping crane. If the project is not constructed, no changes in the population or distribution are expected.

8.0 RESTORATION BENEFITS AND RECOMMENDATIONS.

8.1 Indian River Lagoon. Implementation of alternative 2 will result in substantial benefits to fish and wildlife resources by restoring salinities and improving water quality in the IRL and Turkey Creek. As discussed previously, the reduction in freshwater flows from the C-1 Canal via Turkey Creek into the IRL will allow salinity levels to remain more constant. This will improve conditions for propagation of seagrasses that have been steadily declining since 1943. These seagrasses provide multiple benefits to the estuarine ecosystem because seagrass beds provide habitat and forage for a variety of species inhabiting the IRL including fish, turtles and mammals. These improved conditions will benefit the commercial and recreational fisheries of the IRL, in addition to providing food for sea turtles and manatees.

Reducing the freshwater flows into Turkey Creek and the IRL will also reduce the levels of sediments and nutrients entering the creek and the IRL, which will, in turn, provide benefits through improved water quality. It is known that larval and juvenile clams are more severely impacted by depressed salinities than adults. Significant impacts to growth and increased mortality of juveniles occurs below 15 ppt after two (2) weeks. Therefore, reducing the frequency of freshwater discharges from the C-1 Canal in excess of 700 cfs (3-year storm event) will allow salinities to be maintained at or above 20 ppt during the hard clam spawning seasons of spring (March – May) and fall (September – November) (Steward & Higman, 1989/1997). Further, these reductions in frequency of discharges will result in reduced stream bank erosion in Turkey Creek. It should be noted however, that sufficient base flow discharges will be released to maintain the ecology of Turkey Creek.

8.2 Upper St. Johns River Basin. The southern end of the C-1 Retention Area which is predominantly covered by sawgrass may be used as a foraging area for the snail kite which nests south of the C-1 Area. Flooding the C-1 Retention Area may result in impacts to sawgrass, however, despite attempts to obtain data regarding the effects of this type of flooding on the sawgrass, studies obtained did not answer this specific question, but provided broader information. Data that was obtained indicated that Lake Okeechobee historically had an extensive sawgrass marsh along the western shore. At that time, water levels within the marsh were level with the water surface of the lake throughout much of the year, reaching two feet deep in the wet season (Slider, 2001).

However, recent expansions of cattail (*Typha domingensis*) into areas of the Everglades that were predominantly sawgrass raised questions and prompted research to examine the response of cattail and sawgrass to changes in nutrients and hydroperiods. The results of these studies indicate that sawgrass tolerates increased hydroperiods, and while seeds are inhibited from germinating during periods of flooding, they actually increase in viability over time allowing germination during the dry season. However, Sklar also reported that sawgrass seedlings did not survive when totally inundated with greater than 8 inches of water, whereas all cattail seedlings did survive under these conditions. Chabbi (1999) speculates that nutrient availability and oxygen deficiency play key roles in the competitive interactions between the sawgrass and invasive species such as cattails. Sklar noted that during periods of flooding there was no connection found between phosphorous availability and sawgrass, whereas cattails may utilize increased phosphorous levels to promote oxygenation and growth. This is consistent with previous studies conducted by Urban, 1993 and Newman, 1996. In effect, the existing studies indicate that mature stands of sawgrass may survive extended periods of flooding, but the timing and length of the hydroperiods may impact regeneration of the sawgrass. Further, while increased nutrient loading from the C-1 Canal will not impact the sawgrass, it may provide nutrients to other species which could out compete the sawgrass. With reference to the proposed project, impacts to the sawgrass will be dependent on the timing (i.e. during young seedling growth stage) and duration of inundation.

As noted previously, the southern half of the SLWMA (with the exception of the southeastern corner) is at a lower elevation resulting in vegetative cover that is comprised predominantly of wetland species such as *Spartina bakerii*, *Juncus effuses*, *Panicum hemitomon*, and *Eleocharis spp*. The northern half of the management area is at a higher elevation and has been used as pastureland. High marsh plants such as the *Spartina* and *Juncus* provide cover, forage habitat and/or nesting habitat for wading birds, songbirds and some small mammals such as those described in section 6.3.5 of this document. The *Spartina* is generally found growing in moist locations but it adapts to dryer conditions well (Haehle et. al., 1999). *Juncus* grows well in wet soil or around water bodies in three to five inches of water. Neither species is well adapted to growing in water that is 18 to 24 inches in depth. Subsequently, it is anticipated that the SLWMA will undergo a major change in dominant vegetation following completion of the proposed project. Although it is impossible to predict with any certainty the array of plant species that may colonize this area, it is anticipated that, emergent, free-floating, and submergent vegetation such as *Pontedaria*, *Sagittaria*, *Eichhornia*, *Salvinia*, and *Hydrilla* may become the predominant vegetative cover as the area adapts to permanent inundation. Determination of predominant vegetation will be dependent on the nutrient content of the soils, seed sources that are present in the area or in the nearby vicinity, and the resulting hydroperiod/water depth.

Improved water quality in the IRL by reduction of freshwater inflows from the C-1 Canal while not adversely affecting the water quality in the SJMCA is one of the objectives for this project. The C-1 Retention Area and the SLWMA will be used to "clean" the stormwater runoff prior to discharge into the SJMCA. This influx of nutrients into the system may very well increase the density of vegetation species that colonize the area

The SJRWMD reported during review of the draft CAR for this project that there is no evidence that the SLWMA was ever used for row crop farming, and therefore was not subject to intense pesticide application. As such, if future information indicates that row crop farming and associated pesticide applications have occurred, then these soils should be tested to determine levels of contaminants prior to use for flood control. This data is needed to protect wildlife from pesticides and to determine if flooding of the SLWMA will result in unacceptable levels of contaminant releases to the SJMCA. It should be noted that maintaining this area as a wetland with a water cover will prevent phosphorus releases from the sediments and potential impacts to the SJMCA.

A separate, but related issue involves the potential spread of *Hydrilla* resulting from the Lakes Sawgrass and Hell'n Blazes Dredging Project. There are extensive infestations of *Hydrilla* in the lake system. As these lakes are dredged, the material will be disposed of in the SLWMA. There are concerns that as this area is managed as a wetland, the *Hydrilla* may infest this area and be spread further through the recirculation of water with the C-1 Retention Basin and the discharge into the SJMCA. It is recommended that an aquatic plant management control program be developed to protect resources that are not currently infested with *Hydrilla*.

Wading birds will continue to use the area for foraging. However, nesting activity dependent on the existing vegetative cover will change, as will the use of the area by small mammals for forage and cover. In contrast, it is anticipated that the area may provide more suitable habitat for the apple snail, which is used for food by the snail kite, and some wading birds.

Wood storks have been observed in the vicinity of the SLWMA and associated canals. The area, once flooded will result in shallow maintained wetlands, providing a potentially significant increase in foraging habitat for the storks and for whooping cranes. There has been no nesting of the caracara reported in the SJWMD. Since the proposed project will result in the C-1 Retention Area and the SLWMA becoming significantly wetter, it is unlikely that this species will begin utilizing the area.

As vegetative species adapt in the SLWMA following flooding, it is likely that the apple snail may become a more prominent species, which in turn may provide a significant source of food for the snail kite. The high nutrient content of the water will encourage the growth of vegetation. The type of growth that occurs, i.e. emergent, submergent, or floating, will determine how well the kite can utilize the area for foraging. Snail kites have not been documented using the SLWMA in the past; therefore, the snail kite distribution in the USJRB may increase or remain unchanged.

The eastern indigo snake has been observed in the project area, and while flooding of the C-1 Retention Basin and the SLWMA will reduce the amount of available habitat in the immediate area, there remains many thousands of acres in the USJRB suitable for this species. In addition, as the water levels recede in the C-1 Retention Area and the SLWMA retains ≤ 2 feet of water, a variety of cover and foraging habitats will be provided for the snake.

Using the C-1 Retention Area and the SLWMA for nutrient uptake will provide protection of the SJMCA from discharge of floodwater borne contaminants. This flow-through system will provide benefits through removal of excessive nutrients and subsequent improvement of water quality prior to release into the SJMCA. Therefore, providing the ability to regulate water levels in the C-1 Retention Area and the SLWMA will benefit wetland functions and provide protection of the SJMCA ecosystem and the St. Johns River.

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APPENDIX E – USFWS COORDINATION ACT REPORT/ COE ACQUATIC RESTORATION PLAN

March 1999

South Atlantic Division
Jacksonville District

SECTION 206 PRELIMINARY RESTORATION PLAN
C-1 Re-diversion, Brevard County, Florida

1. PROJECT:

- a. Name of Proposed Modification. C-1 Re-diversion Project, Brevard County, Florida. CWIS Number to be determined.
- b. Project Being Modified. Not Applicable
- c. Authorization. Not Applicable
- d. Congressional District. Florida District 15, Congressman David Weldon

2. LOCATION:

C-1 is located near coastal Brevard County, Florida (see Figure 1). It is hydraulically connected to the Indian River Lagoon, and traverses the city of Palm Bay via Turkey Creek. This canal provides flood protection to nearly 80,000 people; it carries soils, nutrients (nitrogen and phosphorus) and large volumes of freshwater from the historic St. Johns River floodplain eastward to Turkey creek and the lagoon. An existing, uncontrolled (not gated) water control structure, MS-1, functions as a salinity barrier.

3. DESCRIPTION OF THE PROPOSED RESTORATION

a. Background. The central Indian River Lagoon is considered a critical area in need of water quality improvements and habitat restoration. The damages are mostly a result of the large freshwater discharges from Canal 1. Over 90% of the annual volume of fresh water and 68% to 80% of the annual loadings of primary pollutants discharged through Turkey Creek to the IRL are contributed by Canal 1. These discharges have (a) caused precipitous and sustained drops in salinities; (b) over-enriched the creek and lagoon with suspended matter and nutrients; and (3) created erosive velocities which have damaged substantial portions of the embankment along Turkey Creek near the city of Palm Bay. (A separate Section 206 project is being performed for erosion control measures in Palm Bay). Nutrient induced algal growth, dissolved organic and particulate matter runoff, and muck re-suspension are believed to contribute significantly to the loss of seagrass because they attenuate light. Since 1943 there has been an

Approved: _____ Date: _____

acres to 120 acres in the Melbourne - Grant area of the lagoon (see figures 2 thru 3).

b. Environmental Setting. The water currently being discharged into the C-1 canal and ultimately into the IRL is a mixture of urban run-off, agricultural run-off, rain and floodwaters. The resulting combination is extremely high in both particulate matters, such as sediments, pesticides and a variety of inorganic pollutants associated with urban run-off, as well as with the nutrients associated with agricultural fertilization practices, i.e. phosphorous and nitrogen. This mixture of pollutants combined with large volumes of fresh water has a detrimental effect on the estuarine system of the IRL. Some of the fauna most affected by these factors include, but are not limited to: mixed bivalves such as mussels and the commercially important hard clam (*Mercenaria mercenaria*), blue crabs (*Callinectes sapidus*), shrimp (*Penaeus* spp.) seatrout (*Cynoscion* spp.), flounder (*Paralichthys* spp.), red drum (*Sciaenopes ocellatus*), hog choker (*Trinectes maculatus*). The effects on flora are most significant within the populations of seagrasses.

Seagrasses are the historic source of primary productivity in the IRL and a vital habitat to a variety of species both commercially significant, such as seatrout and flounder, and endangered, such as manatee (*Trichechus manatus latirostris*) and green sea turtles (*Chelonia mydas*) whose diet is exclusively limited to seagrass. Nutrient-induced algal growth, high particulate matter and nutrient laden waters are believed to impact seagrasses from as little as 120 acres to as much as approximately 1200 acres. There is also a concurrent rise in the populations of various phytoplanktons and algae. Outbreaks of certain forms of algae and phytoplanktons can lead to fish kills and may help trigger red tides.

The IRL is not the only habitat that is being negatively effected by this highly polluted runoff. The high sediment load of this water has greatly increased the sedimentation rate within Turkey Creek, resulting in a rapid deposition of muck along the channel bottom. This muck can be re-suspended during flood flows, contributing to the above mentioned problems downstream. During low flow, the muck settles on the creek bottom impacting benthic organisms by covering the sand bottom, and also effecting littoral zone vegetation via a shift from primarily lotic communities to more lentic ones.

c. Cultural Resources. If historic properties of the site exist, then these will be identified and assessed during the Feasibility phase of the study. All investigations will be coordinated through the State Historic Preservation Officer and conducted in compliance

d. Proposed Restoration. In order to achieve aquatic restoration of the central Indian River Lagoon, the large freshwater releases from C-1 must be prevented. The drainage basin served by C-1 is bounded on the west by the St. Johns River, and on the East by the Indian River Lagoon. A coastal ridge that runs north-south bisects the basin. Historically, rainfall would flow to either the St. Johns River or the Indian River Lagoon depending on which side of the divide it fell on. However, landowners on both sides of the divide constructed canals that convey all rainfall into the C-1 canal; this significantly increased the volumes of water entering the Indian River Lagoon. Some measure of control is afforded by structure MS-1 on Turkey Creek but it is inadequate. The sponsor has developed a comprehensive plan to re-divert much of the C-1 drainage to an inland retention area to be located west of Interstate 95. This will be accomplished by the construction of an Intermediate Water Control Structure (IWCS) on C-1, to be located at the divide point. After waters enter the inland retention area they will be pumped into a marsh treatment system (the Sawgrass Lakes Water Management Area) to be cleaned before further pumping into the St. Johns River marshes. The marshes will provide the filtration needed to remove pollutants before water drains into the St. Johns River. Targeted reductions have been established as goalposts. The main features are shown on figure 5 and described as follows:

- 1) Construction of the Intermediate Water Control Structure (IWCS) which will detain floodwaters from the C-1 canal releasing less volumes of water at a more gradual rate mimicking a more natural hydraulic regime.
- 2) Clean out and enlargement of C-1.
- 3) Increasing the capacity of the two square mile C-1 retention area and acquisition of additional interests in flowage easements within the lowlands immediately west of Levee 74N.
- 4) Placement of a 380cfs capacity pump to discharge water from the area east of Levee 74N into the Sawgrass Lakes Water Management Area (SLWMA)
- 5) Construction of a small spillway structure (S-262) which will discharge the treated water from SLWMA, releasing it into the St. Johns Marsh Conservation Area

Features 2, 3, and 5 are being handled by the sponsor and are described under the paragraph "Supplemental Information". The sponsor is requesting that features 1 and 4, the IWCS and the 380 cfs pump, be completed under the authority of the USACE Section 206

program. The ICWS will be a two (or three)-bay gated concrete spillway capable of discharging up to 5,500 cfs.

Based on the hydrologic modeling analysis of the current project design, most of the desired reduction targets can be met: anticipated reductions for C-1 are:

1) A 70% reduction in the peak discharge generated by the mean annual, 24-hour storm (down from the +/- 1,490 cfs to +/- 440cfs.

2) A 65% reduction in the runoff volume generated by the mean annual, 24-hour storm event.

3) A 40% reduction in the peak discharge generated by the 1-in-10 year return frequency storm.

4) A 50% reduction in the monthly average base flow from C-1 into Turkey Creek.

4. VIEWS OF SPONSOR:

The St. Johns River Water Management District submitted a letter of intent dated 23 November 1998, (Attachment 6) to act as the non-Federal sponsor of this study and agreed to participate in the cost sharing necessary for completion of this project. This is the sponsor's number one priority among their USACE projects within Jacksonville District. The sponsor has verbally accepted the increased O&M costs (from the date of the letter of intent). These had increased from \$19,000 to \$50,000 annually.

5. VIEWS OF FEDERAL, STATE, AND REGIONAL AGENCIES:

This project has high visibility with several government agencies as well as the general public. Within the past several years, public interest has grown substantially. Significant public involvement for the project has generated both state and federal congressional interest. Congressman Weldon in a December 2, 1997 letter to the USACE clearly indicated this project to be a top priority.

6. ENVIRONMENTAL COMPLIANCE REQUIREMENTS:

NEPA documentation will be developed and completed for inclusion in future studies. A hazardous, toxic, and radioactive waste (HTRW) and water quality investigation will be performed as needed. Water quality certification will be done as needed and appropriate pursuant to FAC 62-302.

In accordance with the Fish and Wildlife Coordination Act, coordination with the USFWS will occur, and a Coordination Act Report (CAR) will be produced. Coordination with the USFWS will be conducted in compliance with Section 7 of the Endangered Species Act. Potential impacts of restoration on Federally endangered species inhabiting the area will be determined. The USFWS policy states that long-term restoration goals yielding benefits to the ecosystem as a whole are desirable as long as they do not jeopardize the continued existence of the listed species.

7. COST AND BENEFITS:

Project Feature	Construction Cost
5,500 cfs concrete spillway	6,300,000
SLWMA 380 cfs pump	420,000
TOTAL	6,720,000

Project benefits will be the restoration of what is now a substantially degraded ecosystem that in the past sustained major hard clam mariculture operations. The benefits to benthic species will be immediate upon reduction of the muck and sediments. The recruitment of a wide variety of fish species to the area will follow enhancing both the commercial and recreational fishing industry.

The proposed project will create environmental benefits by eliminating existing impacts. The reduction in fresh water inflows will aid the recovery of the IRL fauna which is most impacted by reduced salinity due to man induced increases in freshwater influx. It will also help reduce both the erosion levels and the sedimentation rate within the Turkey Creek basin. Further benefits lie in the fact that the rerouted water is being discharged into the newly created C-1 Retention basin. This basin is being designed specifically to retain this high nutrient, high sediment content water long enough to allow a large portion of the pollutants to settle out and thus be trapped within the retention basin, before the water is pumped into the Sawgrass Lakes Water Management Area (SLWMA). The SLWMA is part of the greater Upper St. Johns River Basin Restoration Project. It will function to further filter this water before its ultimate release into the St. Johns Marsh Conservation Area. In summation, highly polluted fresh waters currently being diverted directly into an estuarine system will instead be retained and water quality improved, via storage in a retention basin and filtering through a marsh treatment area. The resultant higher quality freshwater will then ultimately be released into a freshwater marsh conservation area.

8. SCHEDULE:

ACTIVITY	DURATION (months)
Report	12
Plans and Specifications	12
Contract Award	4
Construction	18

9. SUPPLEMENTAL INFORMATION: Additional excavation of the C-1 Retention Area is ongoing. The lowlands immediately west of levee 74N have already been purchased. Sponsor is planning to execute work for the remaining items (S-262 and the Canal 1 enlargement and cleanout) after the PCA is signed. They are currently budgeting resources for eventual construction of the remaining features in conjunction with USACE pursuit of approval for funding and construction of the IWCS and the 380 cfs pump.

There exists a Comprehensive Conservation and Management Plan (CCMP) prepared by a multi-agency task force for the entire Indian River Lagoon. This project which will permit the restoration of the historic flow of water back into the St. Johns River (via C-1, the enlarged detention area, and the SLWMA) will complement the goals of the CCMP known as the FSD-12. Action plan FSD-12 (Freshwater and Stormwater Discharges) is designed to undertake a review of the plans of reclamation, standard operating procedures and project works of each large drainage system that directs water into the Lagoon. It is noted in the CCMP, that improved management of freshwater discharges to the Indian River Lagoon will reduce adverse impacts on the lagoon's resources. These resources included water quality, seagrasses, fisheries and sedimentation.

10. FINANCIAL DATA:

a. Table of Expenditures:

	Totals	Non-Federal	Federal	FY00	FY01	FY02	FY03
Report	489		489	489			
P&S	459		459		459		
**Construction	6,720	2,683	4,368			3,000	3,720
Project Total	7,668	2,683	4,985	489	459	3,000	3,720

**Other than non-Federal Sponsor's contributions (Reference EC 1105-2-214, dtd 3 October 1997; Section 12(d) Other Contributions)

Note: Report and Plans and Specifications are initially federally financed, and costs distributed as part of the non-Federal share of project costs during implementation.

b. Non-Federal Requirements: LERRD: \$ 0
Cash: \$ 0
Work-in-kind: \$ 2,700,000
Annual OMRR&R: \$ 50,000

c. The sponsor's WIK contribution is entirely from the cleanout and enlargement of Canal 1.

d. Fully funded cost as found in the PCA. \$ To be determined

11. FEDERAL ALLOCATIONS TO DATE: Only \$10,000 to prepare the Preliminary Restoration Plan has been spent by the Government so far.

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